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MA NEW ENGLAND DIV JUN 79

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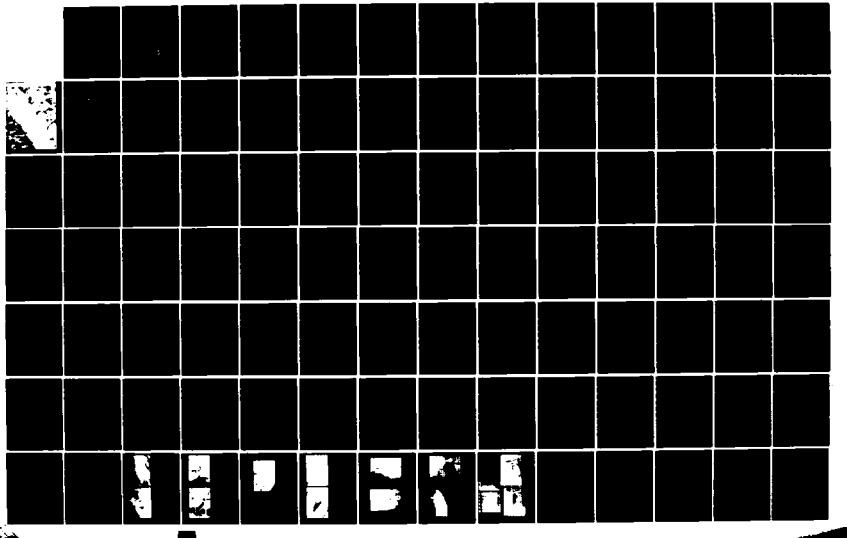

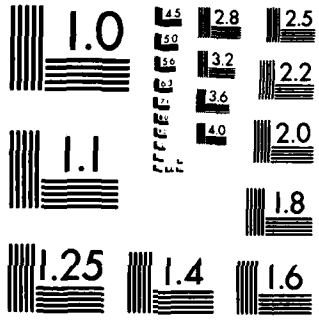

MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

CONNECTICUT RIVER BASIN

WHATELY, MASSACHUSETTS

SOUTH DEERFIELD
MA 00522

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS. 02154

JUNE 1979

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REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER MA 00522	2. GOVT ACCESSION NO.	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) South Deerfield NATIONAL PROGRAM FOR INSPECTION OF NON-FEDERAL DAMS		5. TYPE OF REPORT & PERIOD COVERED INSPECTION REPORT 6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s) U.S. ARMY CORPS OF ENGINEERS NEW ENGLAND DIVISION		8. CONTRACT OR GRANT NUMBER(s)
9. PERFORMING ORGANIZATION NAME AND ADDRESS		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
11. CONTROLLING OFFICE NAME AND ADDRESS DEPT. OF THE ARMY, CORPS OF ENGINEERS NEW ENGLAND DIVISION, NEDED 424 TRAPELO ROAD, WALTHAM, MA. 02254		12. REPORT DATE June 1979 13. NUMBER OF PAGES 53
14. MONITORING AGENCY NAME & ADDRESS(if different from Controlling Office)		15. SECURITY CLASS. (of this report) UNCLASSIFIED 15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

16. DISTRIBUTION STATEMENT (of this Report)

APPROVAL FOR PUBLIC RELEASE: DISTRIBUTION UNLIMITED

17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)

18. SUPPLEMENTARY NOTES

Cover program reads: Phase I Inspection Report, National Dam Inspection Program; however, the official title of the program is: National Program for Inspection of Non-Federal Dams; use cover date for date of report.

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

DAMS, INSPECTION, DAM SAFETY,

Connecticut River Basin
Whately, Massachusetts
Roaring Brook (Tributary to Mill River)

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

The dam is a 120 ft. long concrete arch dam. The visual inspection did not disclose any findings that indicate an immediate unsafe condition. The dam a size classification of small and a hazard potential of low. The dam is generally in good condition and failure of it would not cause any flooding any homes downstream.

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DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
424 TRAPELO ROAD
WALTHAM, MASSACHUSETTS 02154

REPLY TO
ATTENTION OF:
NEDED

AUG 15 1979

Honorable Edward J. King
Governor of the Commonwealth of
Massachusetts
State House
Boston, Massachusetts 02133

Dear Governor King:

I am forwarding to you a copy of the South Deerfield Phase I Inspection Report, which was prepared under the National Program for Inspection of Non-Federal Dams. This report is presented for your use and is based upon a visual inspection, a review of the past performance and a brief hydrological study of the dam. A brief assessment is included at the beginning of the report. I have approved the report and support the findings and recommendations described in Section 7 and ask that you keep me informed of the actions taken to implement them. This follow-up action is a vitally important part of this program.

A copy of this report has been forwarded to the Department of Environmental Quality Engineering, the cooperating agency for the Commonwealth of Massachusetts. In addition, a copy of the report has also been furnished the owner, South Deerfield Water Supply District Board of Water Commissioners, South Deerfield, Massachusetts 01373.

Copies of this report will be made available to the public, upon request, by this office under the Freedom of Information Act. In the case of this report the release date will be thirty days from the date of this letter.

I wish to take this opportunity to thank you and the Department of Environmental Quality Engineering for your cooperation in carrying out this program.

Sincerely yours,

Max B. Scheider

MAX B. SCHEIDER
Colonel, Corps of Engineers
Division Engineer

Incl
As stated

NATIONAL DAM INSPECTION PROGRAM

PHASE I INSPECTION REPORT

BRIEF ASSESSMENT

Identification No.: MA 00522

Name of Dam: South Deerfield Water Supply

Town: Whately

County and State: Hampshire County, Massachusetts

Stream: Roaring Brook (Tributory to Mill River)

Dates of Inspection: December 4, 1978 & April 12, 1979

The dam is a 120 foot long concrete arch dam. It contains a 40 foot long, 28 foot high ogee spillway with provisions for three feet of flashboards, a 32 foot high, 53 foot long concrete non-overflow section and an intake structure with manual controls. The existing dam was constructed in 1953 utilizing portions of an earlier lower dam constructed in 1905. The dam is owned, operated and maintained by the South Deerfield Water Department and has always been used for water supply.

The visual inspection did not disclose any findings that indicate an immediate unsafe condition.

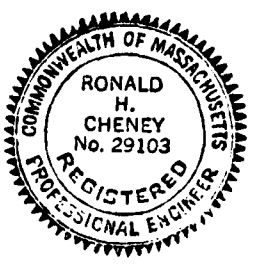
The dam has a size classification of small and a hazard classification of low. Based on Corps guidelines the test flood would be the 50 to 100 year storm. The 100 year test flood used has an inflow and outflow of 1400 cfs which would overtop the non-overflow section by 1.8 feet with 3 feet of

flashboards in place on the spillway. With 3 feet of flashboards in place, normal operation, the spillway capacity to the top of dam (elevation 424) is 124± cfs or about 9 percent of the test flood outflow. The overtopping of this non-overflow section is not serious since it is of concrete construction and can effectively act as an auxiliary overflow spillway.

Failure of the dam would not cause flooding of any downstream homes. 1953 hydraulic design calculations provided the engineer W.C. Wentworth considered a design discharge within the 50 to 100 year storm range.

The dam is in generally good condition. However, the owner should frequently monitor the seepage from joints in the right abutment rock and the contact area between the left abutment and the downstream face. The owner should repair cracks in the concrete face and monitor the horizontal and vertical construction joints and/or cracks to determine if seepage occurs in the future. The owner should implement these measures within 2 years after receipt of this Phase I Report. The dam should be inspected every two years by qualified personnel who can identify areas of concern which if left unchecked could jeopardize the safety of the dam.

Ronald H. Cheney



Ronald H. Cheney, P.E.
Associate

Hayden, Harding & Buchanan, Inc.
Boston, Massachusetts

This Phase I Inspection Report on South Deerfield has been reviewed by the undersigned Review Board members. In our opinion, the reported findings, conclusions, and recommendations are consistent with the Recommended Guidelines for Safety Inspection of Dams, and with good engineering judgment and practice, and is hereby submitted for approval.

JOSEPH W. FINEGAN, JR., MEMBER
Water Control Branch
Engineering Division

JOSEPH A. MCELROY, MEMBER
Foundation & Materials Branch
Engineering Division

CARNEY M. TERZIAN, CHAIRMAN
Chief, Structural Section
Design Branch
Engineering Division

APPROVAL RECOMMENDED:

JOE B. FRYAR
Chief, Engineering Division

PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams, for Phase I Inspections. Copies of these guidelines may be obtained from the Office of Chief of Engineers, Washington, D.C. 20314. The purpose of a Phase I Investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigation, and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I Investigation: however, the investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability and safety of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under the normal operating environment of the structure.

It is important to note that the condition of a dam depends or numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through continued care and inspection can there be any chance that unsafe conditions be detected.

Phase I inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the Spillway Test flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonably possible storm runoff), or fractions thereof. Because of the magnitude and rarity of such a storm event, a finding that a spillway will not pass the test flood should not be interpreted as necessarily posing a highly inadequate condition. The test flood provides a measure of relative spillway capacity and serves as an aide in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition and the downstream damage potential.

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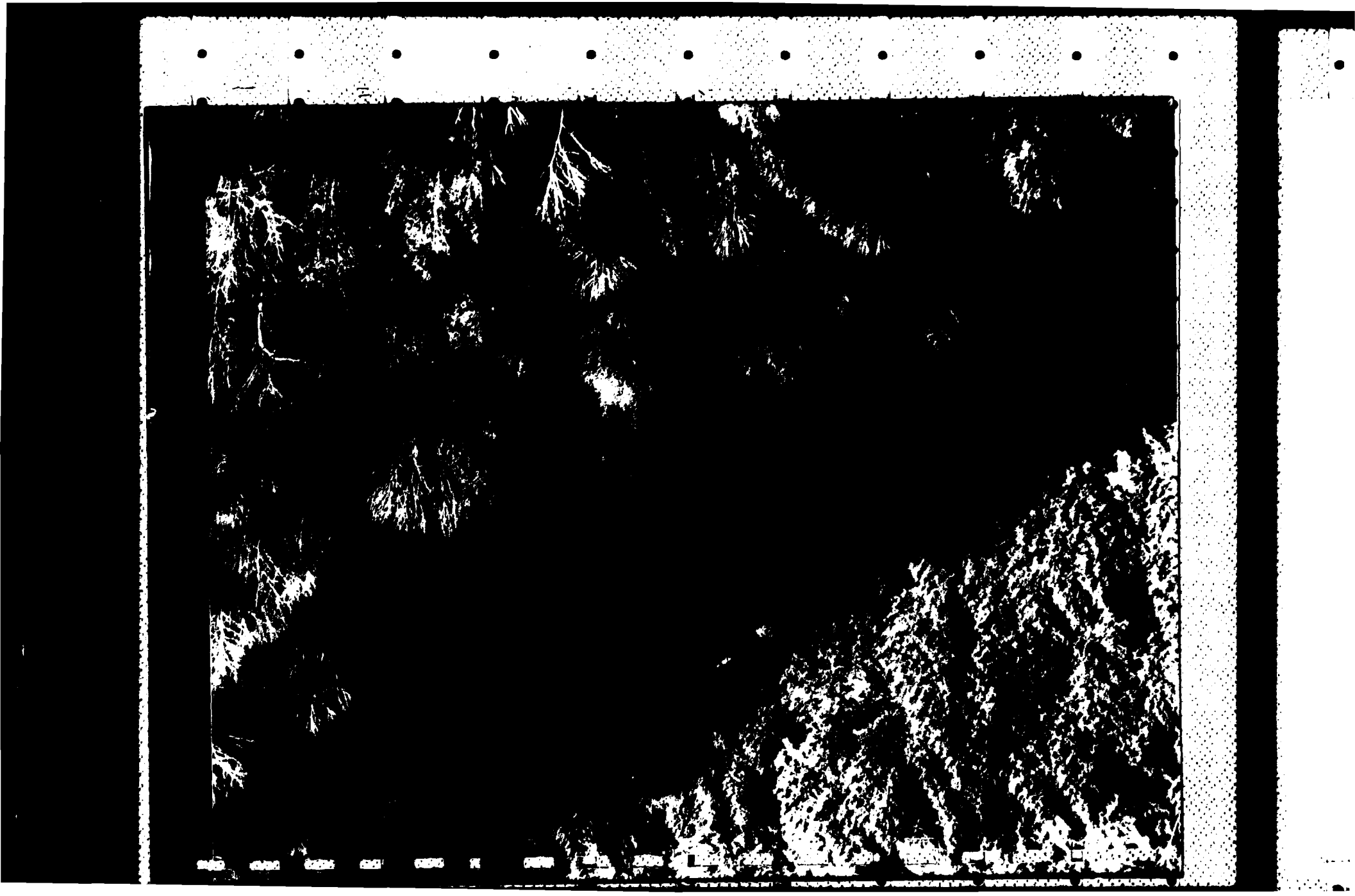
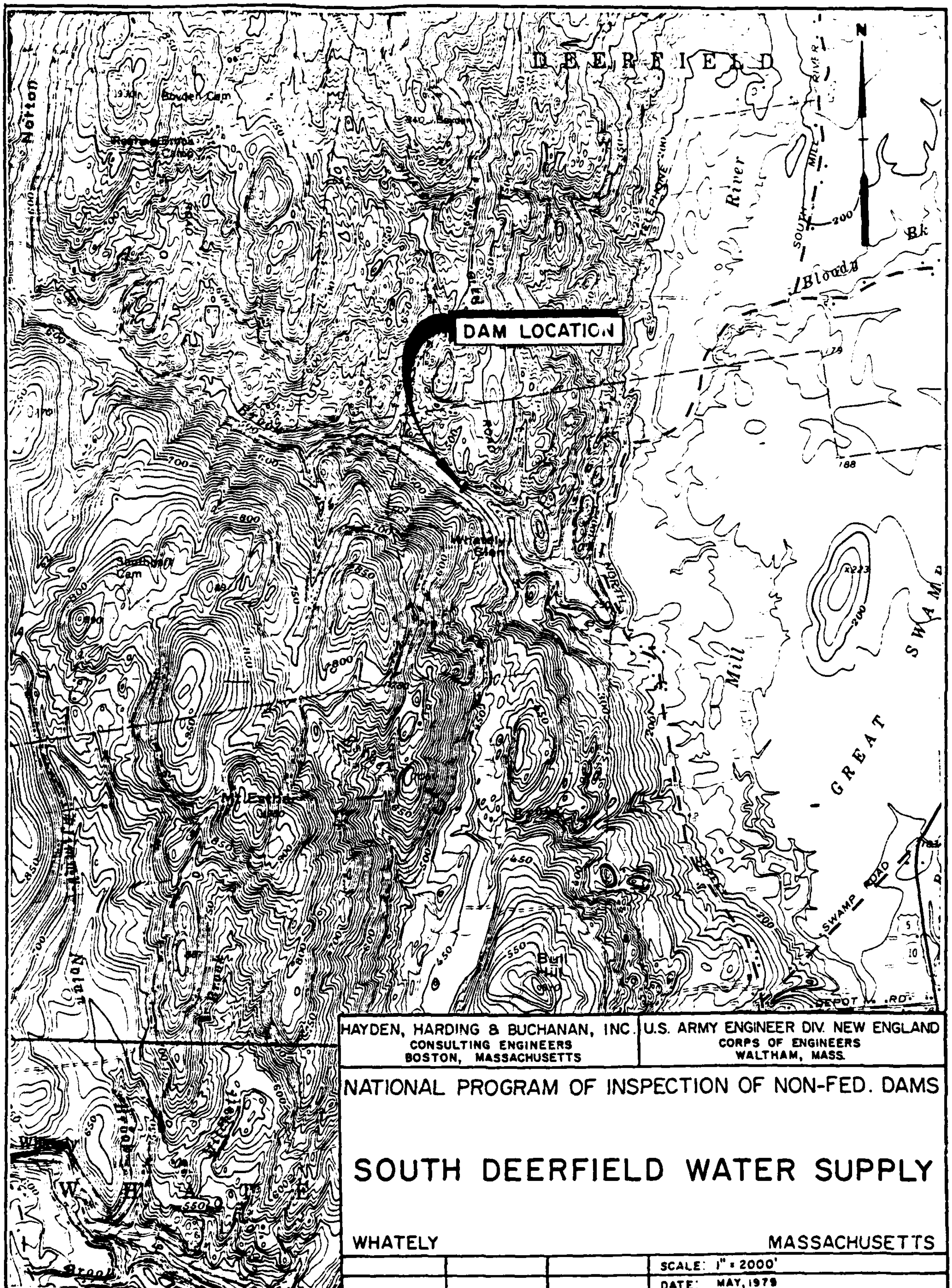
APPENDIXES





DEERFIELD
N
River
Bloody
Bk
DAM LOCATION
Mill
GREAT
SWAMP
SWAMP ROAD
DEPOT RD
Bull Hill
HAYDEN, HARDING & BUCHANAN, INC.
CONSULTING ENGINEERS
BOSTON, MASSACHUSETTS
U.S. ARMY ENGINEER DIV. NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM, MASS.
NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS
SOUTH DEERFIELD WATER SUPPLY
WHATELY
MASSACHUSETTS
SCALE: 1" = 2000'
DATE: MAY, 1979

PHASE I
NATIONAL DAM INSPECTION PROGRAM
NAME OF DAM: SOUTH DEERFIELD WATER SUPPLY

SECTION 1
PROJECT INFORMATION

1.1 General

a. Authority

Public Law 92-367, August 8, 1972, authorized the Secretary of the Army, through the Corps of Engineers, to initiate a national program of dam inspection throughout the United States. The New England Division of the Corps of Engineers has been assigned the responsibility of supervising the inspection of dams within the New England Region. Hayden, Harding & Buchanan, Inc. has been retained by the New England Division to inspect and report on selected dams in the State of Massachusetts. Authorization and notice to proceed was issued Hayden, Harding & Buchanan, Inc. under a letter of 28 November 1978 from Max B. Scheider, Colonel, Corps of Engineers. Contract No. DACW 33-79-C-0012 has been assigned by the Corps of Engineers for this work.

b. Purpose

(1) Perform technical inspection and evaluation of non-Federal dams to identify conditions which threaten the public safety and thus permit correction in a timely manner by non-Federal interests.

(2) Encourage and assist the States to initiate quickly effective dam safety programs for non-Federal dams.

(3) To update, verify and complete the National Inventory of Dams.

1.2 Description of Project

a. Location

South Deerfield Water Supply is located in the Town of Whately, in Hampshire County, Massachusetts. The dam impounds water from the Roaring Brook just North of Whately Glen. It is shown on the Williamsburg Quadrangle, having the approximate coordinates of North 42° 28' 00", West 72° 39' 12". Roaring Brook is a tributory to the Mill River.

b. Description of Dam and Appurtenances

South Deerfield Water Supply, is a concrete arch dam approximately 120 feet long. The dam is generally comprised of a 40 foot long ogee spillway, an intake structure with controls, and a concrete non-overflow section. The spillway has a structural height of approximately 28± feet, a downstream face sloped 7.25 horizontal to 12 vertical and a upstream face sloped 3/4 horizontal to 12 vertical. The spillway has provisions for 3 feet of flashboard which are manually installed. Flashboards are normally used.

The concrete non-overflow section has a length of 53 feet, a structural height of about 32 feet, and a top width of 5 feet. The upstream face is sloped at 3/4 horizontal to 12 vertical and the downstream face is sloped at 7.25 horizontal to 12 vertical. The central core of the non-overflow section and the spillway contain portions of an earlier lower concrete and stone structure.

The intake structure is located between the non-overflow section and the spillway. It houses the dam's operational controls. These controls consist of an upper and lower intake gate for the intake structure at inverts 411.5 and 402 respectively, 2 main drawdown lines, a bypass intake and the inlet-outlet control for the town's main water system. There is also a internal inlet structure control and a 12 inch diameter intake structure drain control. Further explanation of these facilities and normal operational procedures are outlined in Section 1.2.i of this report.

There is a metal guardrail around the intake structure and on the downstream top of crest of the non-overflow section. A stairway with double guardrails extends from the left side slope of the channel upward to the access road area (approximately 75 vertical feet). There are two small wooden sheds downstream of the dam which are used for storage.

c. Size Classification

The dam is classified as small based on its hydraulic height of 26 feet and storage capacity of 22.5 a-f.

d. Hazard Classification

This dam has a low hazard potential classification due to the lack of downstream development and the dam's small size. Loss of life from dam failure is not apparent. Economic damage may occur at North Street. Here the road and small bridge, yards, field and possibly livestock could be affected.

e. Ownership

The dam is owned by the South Deerfield Water Supply District, Board of Water Commissioners and has always been part of their water supply system.

f. Operator

The dam is maintained and operated by the South Deerfield Water Department, Box 51, South Deerfield, Massachusetts 01373. Mr. John Szymanski is the superintendent of the Department. (telephone 413-665-3540)

g. Purpose of Dam

The dam's purpose is water supply. A 12 inch diameter main line is controlled at the intake structure, which feeds water to the Town water system.

h. Design and Construction History

The original dam located at this site was built around 1905. The existing dam was designed by W.C. Wentworth of Turners Falls, Massachusetts, in 1953. Portions of the original dam are utilized in the existing structure.

i. Normal Operational Procedure

This facility along with 2 upstream town dams, is regulated so as to maintain reserve capacity and provide water for the Town of South Deerfield. Plans of the project are included in Appendix B.

The intake facility consists of 8 gated controls. There are 2 drawdown controls for the reservoir (18 and 24 inch). There is an upper and lower inlet for the intake structure and there is a 12 inch drain from the intake structure which has an outlet downstream of the dam. This drain was originally designed as a supply for the Town of Whately but has never been connected to their system. Also feeding into the intake structure is a 12 inch bypass line from a small upstream diversion dam. The remaining 2 controls consist of an internal intake structure control and an intake-outlet control both on the main 12 inch Town supply line. The controls for the bypass line, the inlet structure control and the intake-outlet control are operated in combination to achieve the desired water flow. Flow can be controlled at the intake structure so that the Town system is fed directly by the upstream dam or from waters impounded by this dam. The caretaker uses his judgement regarding the water demand for the Town in controlling the water flow through this facility, as well as the upstream facilities.

1.3 Pertinent Data

a. Drainage Area

The drainage area (3,226 acres - 5.04 sq. mi.) is rural rolling, mountainous undeveloped land. The main water course within the area is Roaring Brook which flows into the

Mill River about 1 mile downstream of the dam.

Several secondary and unimproved roads cut across the area. The only major development located within the drainage area is Roaring Brook Camp. There is no development located along the Roaring Brook for about 4,000 feet below the dam. At this locale, there are several homes along North Street, within 300 feet of the brook. About 4,500 feet upstream a new 65 foot high earth dam (Roaring Brook Dam) was constructed. It intercepts runoff from 3.3 square miles of land. Thus, only 1.7 square miles contribute direct runoff to this dam.

b. Discharge at Damsite

There are four outlet conduits at this dam. There are two drawdown pipes, one 18" and the other 24" in diameter. These are manually controlled by gate valves. The inverts are at elevation 396±. A 12" Town water supply line is located within the intake structure with an upstream invert at about elevation 399±. There is also a 12" intake structure drain which was originally designed as a main supply for the Town of Whately, but has never been tied into their system. Three feet of flashboards are used on the spillway. Daily records of the water level are not kept.

No information was found regarding maximum impoundments and discharges at this damsite.

At the top of the dam, elevation 424, the capacity of the spillway would be about 1,150 cfs, without flashboards. For the 100 year test flood, the inflow would be 1,400 cfs. Outflow would be approximately 1,400 cfs, at elevation 425. The dam would be overtopped by 1.0 foot.

With 3 feet of flashboards considered, normal operation, inflow and overflow are 1,400 cfs at elevation 425.8. The dam is overtopped by 1.8 feet.

The top of dam in the preceeding discussion refers to the top of the non-overflow section, elevation 424.0.

c. Elevation (ft above MSL)

(1) Streambed at centerline of dam -------- 396±

(2) Maximum tailwater----------401

(3) Upstream portal invert diversion tunnel none

(4) Recreation pool---------- N/A

(5) Full flood control pool ---------- N/A

(6) Spillway crest----------ungated 420
(top of flashboards)---------- 423

(7) Design surcharge (Original Design)----- 424

(8) Top Dam ---------- 424

(9) Test flood design ------ no flashboards 425
surcharge with flashboards 425.8

d. Reservoir

(1) Length of maximum pool----------1400'±

(2) Length of recreation pool----------N/A

(3) Length of flood control pool----------N/A

e. Storage (acre-feet)

(1) Recreation pool----------N/A

(2) Flood control pool----------N/A

(3) Spillway crest pool----------22.5

(4) Top of dam ----------32.1

(5) Test flood pool----------no flashboards 35
with flashboards 38

f. Reservoir Surface (acres)

(1) Spillway crest----------1.5

(2) Top dam----------2.4

(3) Test flood pool---------both conditions--2.8

(4) Recreation pool---------- N/A

(5) Flood control pool----------N/A

g. Dam

(1) Type ----------gravity, concrete arch

(2) Length ---------- 120'

(3) Height ----------32±'

(4) Top Width ----------5'

(5) Side Slopes 3/4horizontal:12 Vertical
Upstream,7.25:12 Downstream

(6) Zoning ----------none

(7) Impervious Core ----------concrete dam

(8) Cutoff ----------unknown

(9) Grout Curtain -----1953 plans indicate grout holes through dam and into bedrock

h. Diversion and Regulating Tunnel none

i. Spillway

(1) Type ----------broad crested

(2) Length of weir ----------40'

(3) Crest elevation ----------420'

(4) Gates ----------none

(5) U/S Channel ----------river bed

(6) D/S Channel ----------river bed

j. Regulating Outlets

There are 4 regulating outlets from the intake structure. All are controlled by manual gates located within the intake structure. These outlets consist of a 24 inch drawdown (outlet invert at elevation 395), an 18 inch drawdown (outlet invert at elevation 395), a 12" C.I. main (outlet invert at elevation 395.8±) and a 12" intake struc-

ture drain (outlet invert at elevation 399.1±). The 12" drain was originally designed to act as a main supply feed for the Town of Whately, but was never put on line. The spillway has provisions for 3 feet of flashboards. The ungated spillway crest is at elevation 420.

SECTION 2

ENGINEERING DATA

2.1 Design

No design plans or calculations were located regarding the original 1905 dam. A set of design plans for the 1953 dam were provided by the owner. The engineer, Winslow C. Wentworth, provided copies of original 1953 hydraulic design calculations.

2.2 Construction

No information regarding the construction of the dam was located. Field inspection indicated generally good agreement between the 1953 plans and the existing structure.

2.3 Operation

There are no formal records of operational procedures for this dam. All gates are tested two times yearly. Normal operation is determined by the operators judgement of water supply and demand.

2.4 Evaluation

a. Availability

Design plans were made available by the South Deerfield Water Department. State Inspection Reports for the years of 1972, 1975 and 1977 were made available at the Department of Environmental Quality Engineering, Division of Waterways, Boston Office. Mr. Winslow C. Wentworth provided hydraulic design calculations.

b. Adequacy

The lack of indepth engineering data does not allow for a definitive review. Therefore, the adequacy of this dam, structurally and hydraulically, can not be assessed from the standpoint of review of design calculations, but must be based primarily on the visual inspection, past performance history and sound engineering judgement.

c. Validity

The Visual Inspection of this facility showed no reason to question the validity of the information supplied.

SECTION 3

VISUAL INSPECTION

3.1 Findings

a. General

The dam, South Deerfield Water Supply, was inspected on December 4, 1978 and April 12, 1979. During the April inspection, the water level was within 3 inches of the top of flashboard, and both drawdowns were opened. During the December inspection ice and snow on the dam's downstream face limited the inspection.

b. Dam

The dam is a concrete arch dam about 120 feet long comprised of a spillway, a non-overflow section, and an intake structure. The dam is founded on a rock foundation and rock abutments and sketches of the dam in past inspection reports show that the downstream toe is keyed into the rock for a depth of about 2 feet and width of about 4 feet. The top of the dam is about 30 feet above the river bottom. The present dam was constructed about 1953 (Design drawings are dated September, 1953) over a smaller dam built in about 1905. The spillway is a concrete ogee spillway about 40 feet long. The right abutment acts as the training wall for the spillway and a 2 foot wide concrete wall forms the left training wall of the spillway. The non-overflow

section is a 53 foot long concrete structure located at at the left side of the dam. The intake structure is located between the spillway and non-overflow section. A general view of the dam is shown in photo 4.

Visual inspection of the dam indicated it is in generally good condition.

Upstream Face

The upstream face was almost entirely under water at the time of the inspection, photo 4. According to sketches of the dam in past inspection reports, the upstream faces of the spillway and non-overflow section are both sloped at 3/4H:12V. The vertical crack in the downstream face of the non-overflow section (described in the Downstream Face) continues across the crest and down into the upstream pool. The upstream face of the main spillway could not be observed through the water surface.

Crest

The crest of the non-overflow section is about 5 feet wide. The crack described within the Downstream Face of this section extends across the crest, photo 9. No seepage from this crack was observed at the crest. Elsewhere along this section, the crest appeared to be in good condition with no spalling or misalignment.

Downstream Face

The downstream faces of both sections are sloped at 7.25H:12V.

A small amount of seepage was observed through joints in the rock forming the spillway right abutment, as shown in photo 5. Close-up views of the seepage in this area are shown in photos 6 and 7. Seepage through joints in the rock of the right abutment was noted in an April 26, 1977 inspection report.

Photo 3 shows the contact between the left abutment and downstream face. Seepage was observed from this contact about 10 feet below the top of the dam (about elevation 414 feet). A close-up view of the seepage is shown in photo 1. Slight seepage was noted in an April 26, 1977 inspection report where the "concrete wall joins ledge base and ledge abutments of dam."

There is a horizontal joint which begins at the right abutment of the spillway and continues through to the 2.0 foot wide left concrete training wall; and along the non-overflow section for approximately 15 linear feet where it is intersected by a vertical joint. Here another horizontal joint continues along the concrete non-overflow section to the left abutment, running several inches above the former horizontal joint. These joints appear to be construction joints, made during the various concrete pours required for the dam modifications made in 1953. No seepage was observed through any of these joints during the field inspection. This series of

joints is shown in photos 12,13 and 14.

The downstream face of the concrete non-overflow section was observed to have a vertical crack extending from the toe to the top of dam, across the crest and down into the upstream pool, as shown by photos 9, 11 and 14 Minor seepage from this crack was occurring at approximately 7± feet up from the toe. An inspection report dated March 19, 1975 noted seepage through a vertical line crack which "extends from downstream toe of wall up to the top of wall, across the top and down the upstream face." The seepage was reported to be 10 feet to 12 feet from the toe. In an Arpil 26, 1977 inspection report, no sign of seepage through the above vertical crack was noted. However, this latter report indicated minor seepage from a different vertical crack about 15 feet northerly of the spillway.

From this description, it would appear that the vertical construction joint which showed no seepage during our inspection, has exhibited minor seepage in the past.

Inspection of the spillway section indicated a vertical crack running from its toe to the earlier described horizontal construction joint, photo 14. There was no observed seepage through this vertical crack.

Besides the above noted seepage at the vertical crack in the non-overflow section, both sections appeared to be in good condition with no signs of distress or misalignment.

c. Appurtenant Structures

The general condition of the intake structure which could be observed above the water line, was good. The caretaker operates all gates regularly and they appear to be in working order.

d. Reservoir Area

The upstream reservoir is the Roaring Brook and is shown in photo 10. A more detailed description of the drainage area is included in Section 1.3.a.

e. Downstream Channel

The downstream channel is the natural river bed and is shown in photo 2. No significant obstructions existed in the channel at the time of inspection.

3.2 Evaluation

Visual inspection indicates the dam is in generally good condition. Minor seepage was observed through the contact of the left abutment and downstream face. Minor seepage was also observed through a vertical crack in the downstream face of the non-overflow section.

SECTION 4

OPERATIONAL PROCEDURES

4.1 Procedures

No written operational procedures were disclosed for South Deerfield Water Supply. The operator regulates the dam along with a series of 2 upstream town dams to provide water and maintain reserve capabilities for the Town of South Deerfield. A further description of the normal operational procedure is given in Section 1.2.i.

4.2 Maintenance of Dam

The dam is maintained by the Town of South Deerfield Water Department. It is their responsibility to review State Inspection Reports and institute necessary repairs and maintenance.

4.3 Maintenance of Operating Facilities

The caretaker operates and maintains all operational facilities. The condition of the controls are evaluated on a daily basis during the course of normal operation. As an additional measure, all controls are operated two times yearly to further evaluate their condition.

4.4 Description of Warning System

There are no warning systems in effect at this facility.

4.5 Evaluation

Since the dam is operated on a daily basis, most problems within the system are recognized by the caretaker and corrective measures can be instituted fairly rapidly. All gates are tested at least two times yearly to further evaluate their condition. Inspection of the dam should be performed every 2 years by a qualified engineer who can identify any areas of concern which could in time lead to serious deficiencies.

SECTION 5

HYDRAULIC/HYDROLOGIC

5.1 Evaluation of Features

a. General

This dam was built as part of the water supply system for the Town of South Deerfield. The dam is a gravity concrete arch structure founded on ledge. The spillway has a 40 foot wide by 4 foot high freeboard. The entire top of dam can act as an overflow spillway during high water.

A new water supply impoundment has been built about 4500 feet upstream. The dam, Roaring Brook, is a 65 foot high earth structure. Runoff from about 3.3 sqare miles of the drainage area above the South Deerfield Water Supply Dam can be controlled by the new impoundment. Direct runoff comes from a 1.7 square mile area.

b. Design Data

Design calculations for the 1953 modifications of the dam were obtained from Mr. W.C. Wentworth, the design engineer on that project. Using information obtained from the U.S.G.S. and design data from the analyses of other dams in the area, a design inflow/outflow of 1080 cfs (24 hour, 8" runoff, 215 cfs/sm) was used to size the 4' x 40' spillway. Maximum stage is at elevation 424.0, top of dam.

These design calculations are in general agreement with those determined for the test flood and dam failure analysis portion of this study.

c. Experience Data

The maximum impoundments and discharges for this dam are unknown.

d. Visual Observations

Visual observations of the drainage area and general vicinity of the dam show them to be in general agreement with the U.S.G.S. map of this area.

e. Test Flood Analysis

As the dam has a small size classification and a low hazard potential, the test flood would be within the 50 to 100 year frequency event. The design data used for the 1953 modifications of the dam were found to fall within this range.

The spillway is usually operated with 3 feet of flashboards. It was determined that the 40' long by 4' high spillway without flashboards can pass about 1150 cfs, approximately equal to the 1953 design discharge of 1080 cfs. The 100 year test flood inflow and outflow is 1400 cfs. The dam has no storm water storage capacity. This flow would overtop the dam by about 1.0 ±' and 1.8±' to elevations of 425 and 425.8, without and with 3 feet of flashboards, respectively. About 106 feet of the top of dam would act as an overflow spillway.

The test flood inflow, 1400 cfs, was derived by considering 1.7 s.m. of area contributing 956 cfs of direct

runoff to the dam. The remaining 3.3 s.m., which in intercepted by Roaring Brook Dam was considered to contribute 433 cfs as a base outflow. The peak discharges were not assumed to coincide.

f. Dam Failure Analysis

A potential failure of the dam was analyzed with water at the top of the dam. Using the Corps guidelines it was determined that approximately 7473 cfs. of water would be released at failure of the structure. Just prior to to dam failure, base flow would be 124 cfs. Depth of water would be about 1 to 2 feet. The stream valley downstream would be flooded, but there is no development until the stream reaches North Street about 4000' downstream. At this point the roadway would be overtopped, but no structures would be damaged. Yards, farm buildings, fields and livestock may be affected. The flood stage here is about 6 feet. The depth of flooding on adjacent land is 2 feet or less. Below this location, the stream's flood plain widens and there is no further development.

SECTION 6

STRUCTURAL STABILITY

6.1 Evaluation of Structural Stability

a. Visual Observation

The visual observations did not disclose any immediate stability problems.

b. Design and Construction Data

The present dam was built about 1953 over an original smaller dam constructed about 1905.

Design drawings of the original dam indicate that it was an arch dam similar in shape to the present dam with its top about 15 feet above the river bottom. A cross section of the original dam shows it to be comprised of stone with a concrete upstream face and downstream gunite face. The drawings indicate 1) seven slanted grout holes (series B) through the upstream toe of the original dam and into the foundation bedrock, and 2) eight vertical grout holes (series A) through the crest of the dam and into the foundation bedrock.

The present dam was constructed around the original dam. Concrete was placed upstream, downstream, and above the original dam, totally encapsulating it. The downstream toe was keyed into the foundation bedrock.

c. Operating Records

No operating records were disclosed.

d. Post-Construction Changes

Post-construction changes that are known to have been made are outlined in Section 6.1.b.

e. Seismic Stability

The dam is located in Seismic Zone 2 and in a accordance with the recommended Phase I guidelines does not warrant seismic analysis.

SECTION 7

ASSESSMENT, RECOMMENDATIONS, AND REMEDIAL MEASURES

7.1 Dam Assessment

a. Condition

The visual inspection indicates the dam is in generally good condition.

b. Adequacy of Information

The information made available along with the visual inspection, is adequate for a Phase I level of investigation.

c. Urgency

According to the owner this site is frequently visited for routine operations. The owner therefore could easily implement a system for documenting the relative amounts of seepage referenced in Section 7.3. Although this dam appears to be in generally good condition, the recommendations in Section 7.2 and remedial measures outlined in Section 7.3 should be implemented within two years after receipt of this Phase I Report by the owner.

d. Need for Additional Investigation

No additional investigation is needed to complete the Phase I inspection.

7.2 Recommendations

Based on this Phase I investigation there is no need for further engineering studies or for major alterations to the dam.

7.3 Remedial Measures

a. Operating and Maintenance Procedures

1. Cracks in the concrete face should be repaired before they become enlarged.

2. The owner should establish a periodic procedure for frequently monitoring seepage from the joints of the right abutment and from the contact between the downstream face and left abutment. Also the owner should monitor vertical cracks and joints in the downstream face to determine if seepage occurs in the future.

3. The dam should be inspected every 2 years by a qualified engineer who can identify areas of concern which if left unchecked could jeopardize the safety of the dam.

7.4 Alternatives

There are no alternative recommendations for this dam.

APPENDIX A

INSPECTION CHECKLIST

VISUAL INSPECTION CHECKLIST
PARTY ORGANIZATION

PROJECT South Deerfield Water Supply

DATE April 12, 1979*

TIME 1:30 PM

WEATHER Sunny 50°

W.S. ELEV. 423± U.S. ____ DN.S.

PARTY:

1. Ron Cheney HH&B
2. David Vine HH&B
3. Mike Angieri HH&B
4. Dan LaGatta GEI
5. Tom Keller GEI
6. John Szymanski - South Deerfield Water
7.
8.
9.
10.

	PROJECT FEATURE	INSPECTED BY	REMARKS
1.	Spillway	Ron Cheney, David Vine, Mike Angieri	
2.	Intake Structure	Ron Cheney, David Vine, Mike Angieri	
3.	Non-overflow Section	Ron Cheney, David Vine, Mike Angieri	
4.	Rock Foundation	Dan LaGatta, Tom Keller, John Szymanski	
5.	Hydraulic-Hydrologic	Mike Angieri	
6.			
7.			
8.			
9.			
10.			

* An earlier inspection was made on December 4, 1978, which was limited due to a show cover at the dam site.

PERIODIC INSPECTION CHECKLIST

PROJECT South Deerfield Water Supply DATE 4/12/79

PROJECT FEATURE Dam-General NAME Ron Cheney

DISCIPLINE Structural Engineer NAME Dan LaGatta

Geotechnical Engineer

AREA EVALUATED	CONDITION
IKE EMBANKMENT	(Concrete Arch Dam)
Crest Elevation	424
Current Pool Elevation	423±
Maximum Impoundment to Date	unknown
Surface Cracks	Two cracks noticed. One in the spillway face extending from toe to 1/2± way up. One in non-overflow section. Extends from toe to top of dam, across top and down into upstream pool. Seepage from this crack approximately 7± feet up from toe.
Pavement Condition	none
Movement or Settlement of Crest	none observed
Lateral Movement	none observed
Vertical Alignment	good
Horizontal Alignment	good
Condition at Abutment and at Concrete Structures	no leakage
Indications of Movement of Structural Items on Slopes	none
Trespassing on Slopes	none
Sloughing or Erosion of Slopes or Abutments	N/A
Rock Slope Protection - Riprap Failures	none
Unusual Movement or Cracking at or Near Toes	none observed
Unusual Embankment or Downstream Seepage	none
Piping or Boils	none observed
Foundation Drainage Features	none
Toe Drains	none
Instrumentation System	none
Vegetation	none

PERIODIC INSPECTION CHECKLIST

PROJECT South Deerfield Water Supply DATE 4/12/79

PROJECT FEATURE Intake Structure NAME Ron Cheney

DISCIPLINE Structural Engineer / Geotechnical Engineer NAME Dan LaGatta

AREA EVALUATED	CONDITION
OUTLET WORKS - INTAKE CHANNEL AND INTAKE STRUCTURE	
a. Approach Channel	There is no approach channel
Slope Conditions	
Bottom Conditions	
Rock Slides or Falls	
Log Boom	
Debris	
Condition of Concrete Lining	
Drains or Weep Holes	
b. Intake Structure	
Condition of Concrete	Good
Stop Logs and Slots	General condition of this structure above water line is good

PERIODIC INSPECTION CHECKLIST

PROJECT South Deerfield Water Supply DATE 4/12/79

PROJECT FEATURE Outlet Works NAME Ron Cheney

DISCIPLINE Structural Engineer NAME Dan LaGatta

Geotechnical Engineer

AREA EVALUATED	CONDITION
OUTLET WORKS - CONTROL TOWER	
a. Concrete and Structural	No control tower Intake structure contains all operating controls
General Condition	
Condition of Joints	
Spalling	
Visible Reinforcing	
Rusting or Staining of Concrete	
Any Seepage or Efflorescence	
Joint Alignment	
Unusual Seepage or Leaks in Gate Chamber	
Cracks	
Rusting or Corrosion of Steel	
b. Mechanical and Electrical	All controls are manual
Air Vents	
Float Wells	
Crane Hoist	
Elevator	
Hydraulic System	
Service Gates	
Emergency Gates	
Lightning Protection System	
Emergency Power System	
Wiring and Lighting System	

PERIODIC INSPECTION CHECKLIST

PROJECT South Deerfield Water Supply DATE 4/12/79

PROJECT FEATURE Outlet Works NAME Ron Cheney

DISCIPLINE Structural Engineer / Geotechnical Engineer NAME Dan LaGatta

AREA EVALUATED	CONDITION
OUTLET WORKS - TRANSITION AND CONDUIT	There are no transitions or conduit
General Condition of Concrete	
Rust or Staining on Concrete	
Spalling	
Erosion or Cavitation	
Cracking	
Alignment of Monoliths	
Alignment of Joints	
Numbering of Monoliths	

PERIODIC INSPECTION CHECKLIST

PROJECT South Deerfield Water Supply DATE 4/12/79

PROJECT FEATURE Outlet Works NAME Ron Cheney

DISCIPLINE Structural Engineer NAME Dan LaGatta

Geotechnical Engineer

AREA EVALUATED	CONDITION
OUTLET WORKS - OUTLET STRUCTURE AND OUTLET CHANNEL	
General Condition of Concrete	Intake and outlet structures are one and the same. Water from the intake structure is fed to the town water supply line or the outlet channel. All gates are in working order. Draw downs were opened during inspection.
Rust or Staining	
Spalling	
Erosion or Cavitation	
Visible Reinforcing	
Any Seepage or Efflorescence	
Condition at Joints	
Drain holes	
Channel	The outlet channel is 16± feet wide just below dam. A 30± foot long stone wall is on the left side and the natural river bank on the right. Some small trees line the riverbank. Flow was free and clear.
Loose Rock or Trees Overhanging Channel	
Condition of Discharge Channel	

PERIODIC INSPECTION CHECKLIST

PROJECT South Deerfield Water Supply DATE 4/12/79

PROJECT FEATURE Spillway NAME Ron Cheney

DISCIPLINE Structural Engineer NAME Dan LaGatta

Geotechnical Engineer

AREA EVALUATED	CONDITION
OUTLET WORKS - SPILLWAY WEIR, APPROACH AND DISCHARGE CHANNELS	
a. Approach Channel	The approach channel is Roaring Brook.
General Condition	
Loose Rock Overhanging Channel	
Trees Overhanging Channel	
Floor of Approach Channel	Good, there was a horizontal joint running across the spillway at approximately the elevation of the original dam. A vertical crack runs from the toe to the horizontal joint. No seepage through either crack was observed.
b. Weir and Training Walls	
General Condition of Concrete	Some minor
Rust or Staining	Some minor
Spalling	None observed
Any Visible Reinforcing	Some
Any Seepage or Efflorescence	None observed
Drain Holes	Discharge channel same as river channel
c. Discharge Channel	Good
General Condition	None
Loose Rock Overhanging Channel	None of significance
Trees Overhanging Channel	Rock
Floor of Channel	None
Other Obstructions	

PERIODIC INSPECTION CHECKLIST

PROJECT South Deerfield Water Supply DATE 4/12/79

PROJECT FEATURE Service Bridge NAME Ron Cheney

DISCIPLINE Structural Engineer NAME Dan LaGatta

Geotechnical Engineer

AREA EVALUATED	CONDITION
OUTLET WORKS - SERVICE BRIDGE	There is no service bridge
a. Super Structure	
Bearings	
Anchor Bolts	
Bridge Seat	
Longitudinal Members	
Underside of Deck	
Secondary Bracing	
Deck	
Drainage System	
Railings	
Expansion Joints	
Paint	
b. Abutment & Piers	
General Condition of Concrete	
Alignment of Abutment	
Approach to Bridge	
Condition of Seat & Backwall	

APPENDIX B

ENGINEERING DATA

LIST OF AVAILABLE ENGINEERING DATA

1. Design Plans dated 1953 - provided by owner
2. Hydraulic Design Calculations - provided by Engineer Winslow C. Wentworth, 3 Davis Street Turner's Falls, Massachusetts 01376
3. State Inspection Reports for the years 1972,1975,1977- provided by the Department of Environmental Quality Engineering, Division of Waterways, 100 Nashua Street Boston, Massachusetts 02114

The Commonwealth of Massachusetts

EXECUTIVE OFFICE OF ENVIRONMENTAL AFFAIRS
DEPARTMENT OF ENVIRONMENTAL QUALITY ENGR.
DIVISION OF WATERWAYS

100 Nashua Street, Boston 02114

July 29, 1977

South Deerfield Water Supply District
Board of Water Commissioners
Box 51
South Deerfield, Mass.

RE: Insp. Dam #2-6-337-4 -
So. Deerfield Water Supply District Da
Whatley

Gentlemen:

On April 26, 1977 , an Engineer from the Massachusetts Department of Public Works made a visual inspection of the above dam. Our records indicate the owner to be Town of So. Deerfield water Supply Dist.. If this information is incorrect will you please notify this office.

The inspection was made in accordance with the provisions of Chapter 253 of the Massachusetts General Laws as amended (Dams Safety Act). Chapter 706 of the Acts of 1975 transferred the jurisdiction of the so-called "Dams Safety Program" to the Commissioner of the Department of Environmental Quality Engineering.

The results of the inspection indicate that this dam is safe; however, the following conditions were noted that require attention:

Crack in Masonry, across top and vertically down face of dropwall 30'+ from northerly end of dam. Another construction joint crack near northerly end of spillway. These should be corrected. Seepage through ledge seams and at junctures of concrete and ledge should be monitored.

We call these conditions to your attention before they become serious and more expensive to correct. With ary correspondence please include the number of the Dam as indicated above.

Very truly yours,

John J. Hannon, P.E.
Chief Engineer

bjm
cc: F.J. Hoey, D.H.E.
H. Shumway, D.D.R.E.
John Szymanski

INSPECTION REPORT - DAMS AND RESERVOIRS

1. LOCATION:

City/Town Whately. County Franklin. Dam No. 2-6-337-4

Name of Dam South Deerfield Water Supply District Dam.
Mass. Rect.
Topo Sheet No. 11 A. Coordinates: N 536,600, E 288,700.

Inspected by: Harold T. Shumway, On April 26, 1977. Date Last Inspection 3-19-75

2. OWNER/S: As of April 26, 1977

per: Assessors____, Reg. of Deeds____, Prev. Insp. X, Per. Contact X

1. South Deerfield Water Supply District
Board of Water Commissioners, Box 51, South Deerfield, Mass.
Name | St. & No. | City/Town | State | Tel. No.

2. _____
Name | St. & No. | City/Town | State | Tel. No.

3. _____
Name | St. & No. | City/Town | State | Tel. No.

3. CARETAKER: (if any) e.g. superintendent, plant manager, appointed by absentee owner, appointed by multi owners.

Mr. John Szymanski,
Supt. Water Dept., Box 51, South Deerfield, Mass.
Name | St. & No. | City/Town | State | Tel. No.

4. DATA:

No. of Pictures Taken None. Sketches See description of Dam.
Plans, Where In Water Dept. Supt.'s office.

5. DEGREE OF HAZARD: (if dam should fail completely)*

1. Minor____. 3. Severe____.

2. Moderate X. 4. Disastrous____.

Comments: Several residences on low ground near where Roaring Brook enters Mill River. Approximately 14 million gallons impoundment.

*This rating may change as land use changes (future development).

(6.) OUTLETS: OUTLET CONTROLS AND DRAWDOWN

No. 1 Location and Type: Southerly end of dam-40'W.X4'H. concrete crest overflow spillway with an ogee dropwall 29'± high.

Controls Yes, TYPE: 3' high flashboards on crest.

Automatic____. Manual X. Operative Yes X, No____.

Comments: Minor spalling of spillway drop wall face.

No. 2 Location and Type: Approximately center of dam-concrete intake structure.

Controls Yes, Type: 12" disk intake valves.

Automatic____. Manual X. Operative Yes X, No____.

Comments: Structure includes 10" diam. blow-off pipe.

No. 3 Location and Type: East side of intake works-18" diam. C.I. pipe drawdown. West side of intake works-24" diam. C.I. pipe drawdown.

Controls Yes, Type: 18" and 24" sluice gates.

Automatic____. Manual X. Operative Yes X, No____.

Comments: Both gates in working order per Water Dept. Supt.

Drawdown present Yes X, No____. Operative Yes X, No____.
Comments: See item # 3 above-Reservoir drained in 1976.

(7.) DAM UPSTREAM FACE: Slope Vertical, Depth Water at Dam 25' to 29'.

Material: Turf____. Brush & Trees____. Rock fill____. Concrete Masonry X. Wood____

Other____.

Condition: 1. Good____. 3. Major Repairs____.

2. Minor Repairs X. 4. Urgent Repairs____.

Comments: Dam is an arch type concrete dam built on ledge with ledge abutments. 2 vertical cracks noted in top and down stream face of dam-minor seepage noted near base of more southerly crack.

(8.) DAM DOWNSTREAM FACE: Slope 7 1/3 : 12.

Material: Turf____. Brush & Trees____. Rock Fill____. Concrete Masonry X. Wood____

Other____.

Condition: 1. Good____. 3. Major Repairs____.

2. Minor Repairs X. 4. Urgent Repairs____.

Comments: See item #7 comments above-slight seepage also noted where concrete joins ledge at end of dam on northerly end.

(9) EMERGENCY SPILLWAY: Available Yes . Needed .

Height Above Normal Water 1 Ft.

Width 100'± Ft. Height Unlimited Ft. Material Concrete and ledge .

Condition: 1. Good . 3. Major Repairs .

2. Minor Repairs . 4. Urgent Repairs .

Comments: Entire top of dam excepting intake structure would act as spillway in extreme high water levels.

(10) WATER LEVEL AT TIME OF INSPECTION: 1 Ft. Above . Below X .

Top Dam X F.L. Principal Spillway .

Other

Normal Freeboard 1 Ft. With 3' flashboards in place on spillway.

(11) SUMMARY OF DEFICIENCIES NOTED:

Growth (Trees and Brush) on Embankment None found.

Animal Burrows and Washouts None found.

Damage to Slopes or Top of Dam See line below.

Cracked or Damaged Masonry Crack across top and vertically down face of dropwall 30'± from northerly end of dam. Construction joint crack near northerly end of spillway.

Evidence of Seepage Slight seepage through construction joint crack near base of dropwall-also seepage through union of concrete wall with ledge ends.

Evidence of Piping None found.

Leaks None found.

Erosion None found.

Trash and/or Debris Impeding Flow None found.

Clogged or Blocked Spillway None found.

Other

(12) OVERALL CONDITION:

1. Safe_____.
2. Minor repairs needed X
3. Conditionally safe - major repairs needed_____
4. Unsafe_____.
5. Reservoir impoundment no longer exists (explain)

   Recommend removal from inspection list_____

(13) REMARKS AND RECOMMENDATIONS: (Fully Explain)

Mr. John Szymanski, South Deerfield Water Department Supt., was present during this inspection. This is a concrete arch type dam with an ogee dropwall spillway on southerly end of dam. The three foot flash boards were in place on crest of spillway and water was over topping flashboards at time of inspection.

The vertical crack noted in past inspections is still evident but there was no sign of seepage through crack at present inspection. Another vertical crack noted in a construction joint 15'± northerly of spillway extends full height of dam and minor seepage was noted through this crack at base of wall. Slight seepage was noted in some areas where concrete wall joins ledge base and ledge abutments of dam. Seepage was also evident through ledge seams on southerly end of dam. None of these seepage areas appear to be a hazard to safety of dam at present time but it would seem advisable to keep a close check on them for anyincrease in amount of flow and such action was suggested to the Water Dept. Supt. during inspection of dam. The Superintendant agreed that a periodical check on the seepage areas would be made by the Water Dept.

This dam appears to be safe at time of this inspection.

HTS/at

F14

INSPECTION REPORT - DAMS AND RESERVOIRS

1. LOCATION:

~~City~~/Town Whately. County Franklin. Dam No. 2-6-337-4.

Name of Dam South Deerfield Water Supply District Dam.

Topo Sheet No. 11A. Coordinates: Mass. Rect. N 536,600, E 288,700.

Inspected by: H. T. Shumway, On 3-19-75. Date Last Inspection 9-7-72.

---

2. OWNER/S: As of 3-19-75

per: Assessors_____, Reg. of Deeds_____, Prev. Insp. X, Per. Contact_____.

	Name	St. & No.	City/Town	State	Tel. No.
1.	South Deerfield Water Supply District Board of Water Commissioners	Box 51	South Deerfield,	Mass.	413-665-3540
2.					
3.					

3. CARETAKER: (if any) e.g. superintendent, plant manager, appointed by absentee owner, appointed by multi owners.

Name	St. & No.	City/Town	State	Tel. No.
John Szymanski Supt. Water Dept.,	Box 51	South Deerfield,	Mass.	413-665-3540

---

4. DATA:

No. of Pictures Taken None. Sketches See description of Dam.
Plans, Where In Superintendent's office.

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5. DEGREE OF HAZARD: (if dam should fail completely)*

1. Minor_____.
2. Moderate X.
3. Severe_____.
4. Disastrous_____.

Comments: Several residences on low ground near where Roaring Brook enters Mill Rive

*This rating may change as land use changes (future development).

6. OUTLETS: OUTLET CONTROLS AND DRAWDOWN

No. 1 Location and Type: 40' W. X 4' H. conc. crest overflow spillway with ogee drop wall 29'± in height.

Controls Yes, TYPE: 3' flashboards on crest.

Automatic ____. Manual X. Operative Yes X, No ____.

Comments: ____.

No. 2 Location and Type: 18" dia. C.I. pipe drawdown sluice on east side of intake works. 24" dia. C.I. pipe drawdown sluice on west side of intake works.

Controls Yes, Type: 18" and 24" sluice gates.

Automatic ____. Manual X. Operative Yes X, No ____.

Comments: ____.

No. 3 Location and Type: Approx. center of dam - conc. intake structure.

Controls Yes, Type: 12" disk intake valves.

Automatic ____. Manual X. Operative Yes X, No ____.

Comments: Structure includes 10" dia. blow-off pipe.

Drawdown present Yes X, No ____. Operative Yes X, No ____.
Comments: See Item #2 above.

7. DAM UPSTREAM FACE: Slope Vertical, Depth Water at Dam 25' to 29 ft.

Material: Turf ____. Brush & Trees ____. Rock fill ____. Masonry X (conc.). Wood ____.

Other ____.

Condition: 1. Good ____. 3. Major Repairs ____.

2. Minor Repairs X. 4. Urgent Repairs ____.

Comments: Dam is built on ledge with ledge abutments and is a conc. arch type dam. A vertical crack shows above waterline - See sketch.

8. DAM DOWNSTREAM FACE: Slope 7 1/3:12.

Material: Turf ____. Brush & Trees ____. Rock Fill ____. Masonry X (conc.). Wood ____.

Other ____.

Condition: 1. Good ____. 3. Major Repairs ____.

2. Minor Repairs X. 4. Urgent Repairs ____.

Comments: Stilling area at toe - outlet bed is ledge. Vertical crack total height of wall - seepage shows about 12'± up from base of dam in crack - see sketch.

(9.) EMERGENCY SPILLWAY: Available Yes. Needed _____.

Height Above Normal Water 1 Ft.

Width 100'+ Ft. Height unlimited Ft. Material concrete and ledge.

Condition: 1. Good _____. 3. Major Repairs _____.

2. Minor Repairs _____. 4. Urgent Repairs _____.

Comments: Entire top of dam excepting intake structure would act as spillway in extreme high water levels

(10.) WATER LEVEL AT TIME OF INSPECTION: 3 Ft, Above X, Below _____.

Top Dam _____ F.L. Principal Spillway X.

Other 3 foot flashboards in place on crest of spillway

Normal Freeboard 1 Ft, with 3' flashboards in place on spillway.

(11.) SUMMARY OF DEFICIENCIES NOTED:

Growth (Trees and Brush) on Embankment N/A

Animal Burrows and Washouts None found

Damage to Slopes or Top of Dam Yes - see cracked or damaged masonry

Cracked or Damaged Masonry Yes - A vertical line crack extends from toe of downstream face of wall - up the wall- across top of dam and down upstream face

Evidence of Seepage Yes - seepage noted through above described crack about 12' up from toe of dam wall on downstream face.

Evidence of Piping None found

Leaks None found

Erosion None evident

Trash and/or Debris Impeding Flow None found

Clogged or Blocked Spillway Three foot flashboards in place

Other _____

DAM NO. 2-6-337-4

(12.) OVERALL CONDITION:

1. Safe X .
2. Minor repairs needed _____ .
3. Conditionally safe - major repairs needed _____ .
4. Unsafe _____ .
5. Reservoir impoundment no longer exists (explain)

   Recommend removal from inspection list _____ .

(13.) REMARKS AND RECOMMENDATIONS: (Fully Explain)
This dam is a concrete arch type dam with an ogee type overflow spillway on the south westerly end.

This spillway has 3' high flashboards which were in place at time of inspection. Water was overflowing these flashboards 1/4 of a foot deep. On the north easterly portion of dam - (See Sketch) a vertical line crack was noted. This crack extends from downstream toe of wall up to the top of wall, across the top and down the upstream face of wall below the water level. A minor amount of seepage was noted coming through this crack about 10' to 12' up face of wall from toe on downstream face.

This seems to be an existing condition of several years past and does not appear to be a serious problem or hazard to safety of dam at present time.

Dam appears to be safe at time of this inspection.

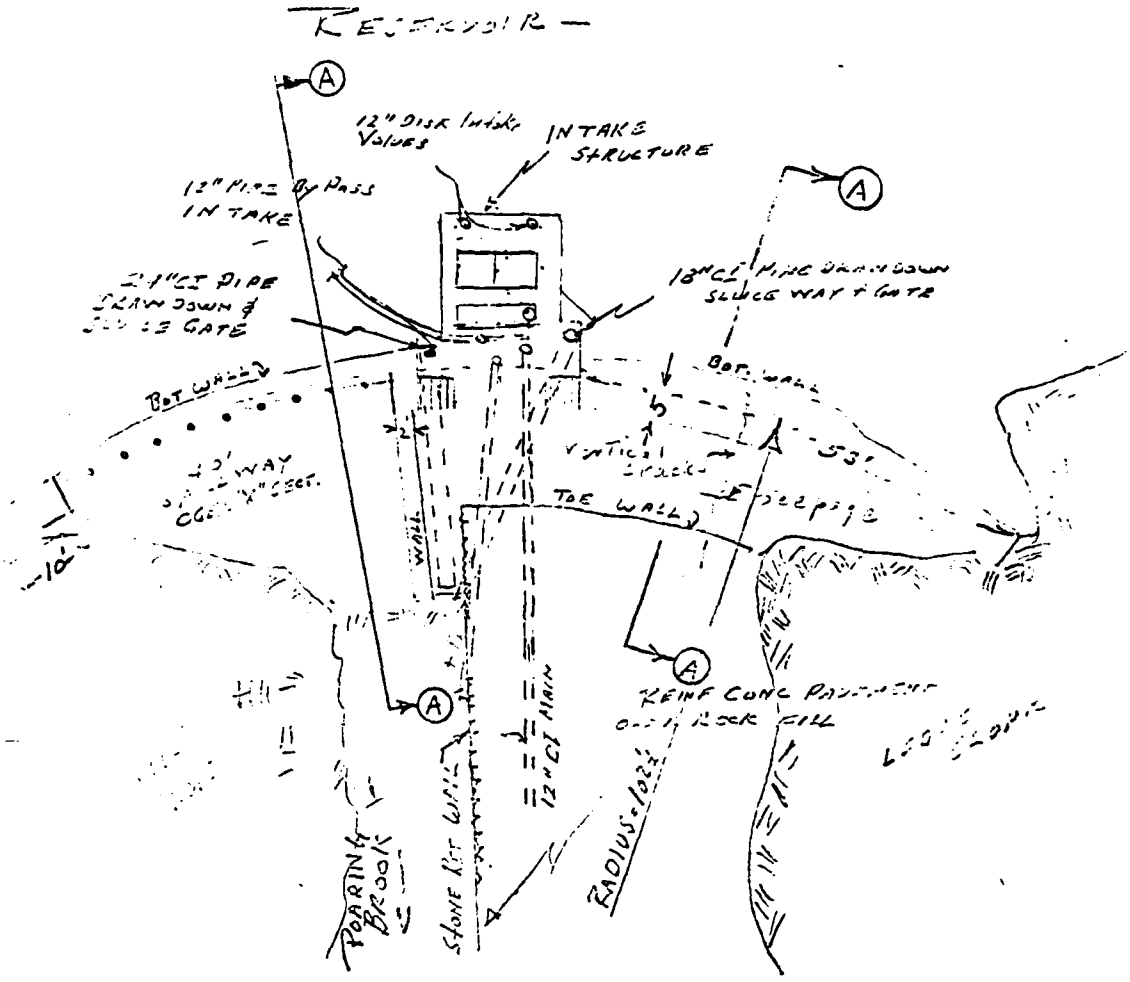
RCS/js

SKETCHS

SHEET No 1 OF 3

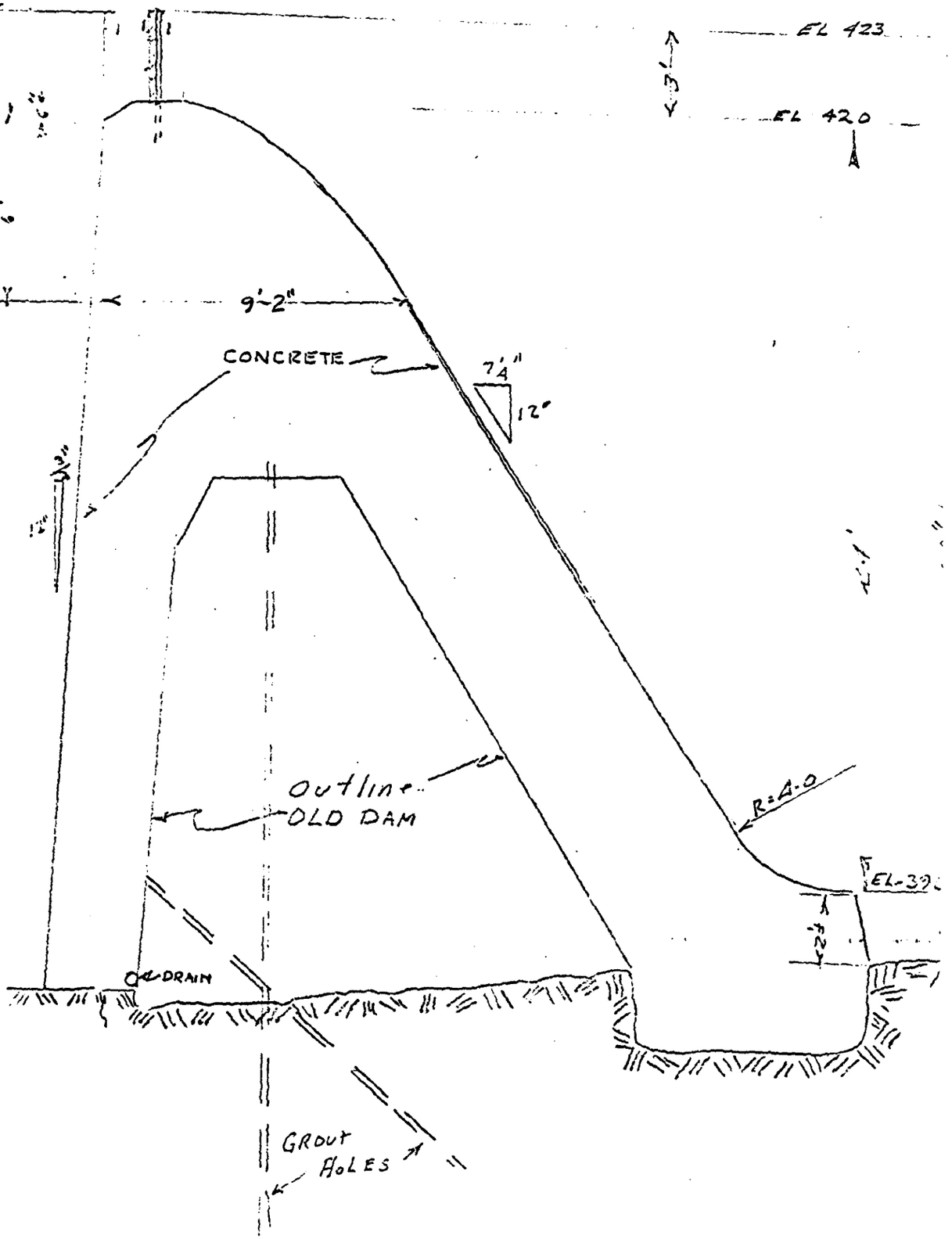
DAM No 2-6-337-4

SOUTH DEERFIELD WATE
SUPPLY DAM



PLAN VIEW CONCRETE ARCH DAM 120'± LONG

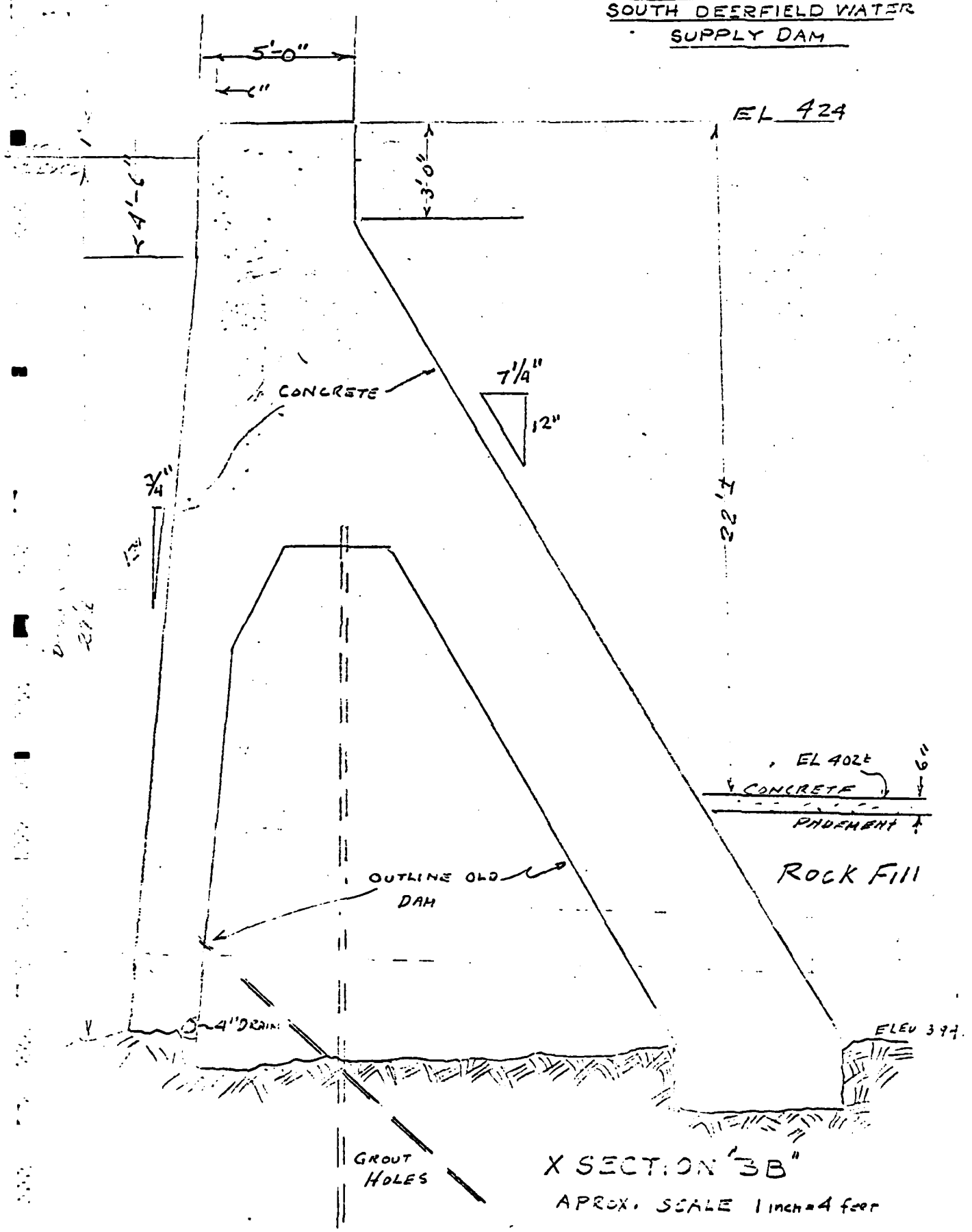
TAKEN FROM PLANS IN WATER
SUPPLY DISTRICT OFFICE
SCALE APROX. 1 inch = 20 Feet.



"Y" SECTION "A.A" THROUGH SPILLWAY

TAKEN FROM WATER SUPPLY
DISTRICT OFFICE -
SCALE APROX. 1 Inch = 4 Feet

DAM No 2-C-337-4
SOUTH DEERFIELD WATER
SUPPLY DAM



X SECTION "3B"

APROX. SCALE 1 inch = 4 feet

INSPECTION REPORT - DAMS AND RESERVOIRS

LOCATION:

Town Whately. County Franklin. Dam No. 2-6-337-4.

Name of Dam South Deerfield Water Supply.

Topo Sheet No. 11A. Mass. Rect. Coordinates: N 536,600, E 288,700.

Inspected by: R.C. Salls, P.E., On Sept. 7, 1972. Date Last Inspection 1970.

OWNER/S: As of

per: Assessors_____, Reg. of Deeds_____, Prev. Insp._____, Per. Contact X.

	Name	St. & No.	City/Town	State	Tel. No.
1.	South Deerfield Water Supply District Board of Water Commissioners	Box 51	South Deerfield	Mass.	665-3540
2.					
3.					

CARETAKER: (if any) e.g. superintendent, plant manager, appointed by absentee owner, appointed by multi owners.

Name	St. & No.	City/Town	State	Tel. No.
John Szymanski, Supt., Water Dept.	Box 51	South Deerfield	Mass.	665-3546

DATA:

No. of Pictures Taken - -. Sketches See Description of Dam

Plans, Where In Supt.'s Office.

DEGREE OF HAZARD: (if dam should fail completely)*

1. Minor_____.
2. Moderate X.
3. Severe_____.
4. Disastrous_____.

Comments: Several residences on low ground near where Roaring Brook enters Mill River.

*This rating may change as land use changes (future development).

6.) OUTLETS: OUTLET CONTROLS AND DRAWDOWN

No. 1 Location and Type: 40' wide x 4' high - OGEE spillway 29'± high @ west end dam.

Controls Yes, Type: 3' flash boards on crest.

Automatic ____. Manual X. Operative Yes X, No ____.

Comments: ____.

No. 2 Location and Type: 18" CI drawdown sluiceway east side intake works. 24" CI drawdown sluiceway west side intake works.

Controls Yes, Type: 24" sluice gate.

Automatic ____. Manual X. Operative Yes X, No ____.

Comments: ____.

No. 3 Location and Type: Water intake including blowoff.

Controls X, Type: Valves.

Automatic ____. Manual X. Operative Yes X, No ____.

Comments: 10" blow of pipe.

Drawdown present Yes X, No ____. Operative Yes X, No ____.

Comments: See No. 2 above.

7.) DAM UPSTREAM FACE: Slope Vertical, Depth Water at Dam 25 - 29 Ft.

Material: Turf ____. Brush & Trees ____. Rock fill ____. Masonry (Conc.) X Wood ____.

Other ____.

Condition: 1. Good X. 3. Major Repairs ____.

2. Minor Repairs ____. 4. Urgent Repairs ____.

Comments: Dam is founded on ledge. Abutments are ledge. Concrete arch dam.

8.) DAM DOWNSTREAM FACE: Slope 7¼ to 12.

Material: Turf ____. Brush & Trees ____. Rock fill ____. Masonry (Conc.) X. Wood ____.

Other ____.

Condition: 1. Good X. 3. Major Repairs ____.

2. Minor Repairs ____. 4. Urgent Repairs ____.

Comments: Stilling area at toe. Spillway is ledge.

(9.) EMERGENCY SPILLWAY: Available Yes. Needed _____.

Height Above Normal Water 1 Ft.

Width 100 Ft. Height - - Ft. Material Concrete.

Condition: 1. Good X. 3. Major Repairs _____.

2. Minor Repairs _____. 4. Urgent Repairs _____.

Comments: Top dam would be spillway except where intake works are.

(10.) WATER LEVEL AT TIME OF INSPECTION: 1 Ft. Above _____. Below X.

Top Dam X F.L. Principal Spillway

Other _____.

Normal Freeboard 1 Ft. with 3' flashboards on spillway.

(11.) SUMMARY OF DEFICIENCIES NOTED:

Growth (Trees and Brush) on Embankment None.

Animal Burrows and Washouts None.

Damage to Slopes or Top of Dam None.

Cracked or Damaged Masonry None.

Evidence of Seepage None.

Evidence of Piping None observed.

Leaks None observed.

Erosion None observed.

Trash and/or Debris Impeding Flow None.

Clogged or Blocked Spillway No.

Other No.

(12.) OVERALL CONDITION:

1. Safe X .
2. Minor repairs needed _____ .
3. Conditionally safe - major repairs needed _____ .
4. Unsafe _____ .
5. Reservoir impoundment no longer exists (explain)

   Recommend removal from inspection list _____ .

(13.) REMARKS AND RECOMMENDATIONS: (Fully Explain)

At the time of inspection this concrete arch dam appeared to be in good condition, well maintained and safe.

RCS/sd/vk

Number 231

2-6-227-4

TOWN WHATELY

Name South Deerfield Water Supply · ~~Inspection~~ Date 1970

Owner South Deerfield Fire District

Location Roaring Brook at the northeast corner of the town and about ½ mile west of the Whately Glen Road.

Type of Pond made

Acreage

Drainage Area

Comments

Type of Dam

Length

Height

Head of Water

Comments

Type of Spillway

Width

Height

Comments

Condition, Previous Report, Dated 1969 This dam is safe

Present Condition

DESCRIPTION OF DAM

DISTRICT 2 .

Submitted by R. C. Salls, P.E. Dam No. 2-6-337-4

Date Sept. 7, 1972 Town Whately

Name of Dam South Deerfield Water Supply Dam

1. Location: Topo Sheet No. 11A Mass. Rect. Coordinates N 536,600 E 288,700

Provide 8½" x 11" in clear copy of topo map with location of Dam clearly indicated.
On Roaring Brook about 1000 Ft. westerly from Whately Glen Rd. about 6/10 of a mile from North St. Access via private dirt road.

2. Year built: 1949 Year/s of subsequent repairs - -

3. Purpose of Dam: Water Supply X Recreational
Irrigation Other

4. Drainage Area: 1.4 sq. mi. acres.

5. Normal Ponding Area: 4.5 Acres; Ave. Depth 12'
Impoundment: 17.6 millions gals; 54.0 acre ft.

6. No. and type of dwellings located adjacent to pond or reservoir
i.e. summer homes etc. None

7. Dimensions of Dam: Length 120 ft.± Max. Height 29 ft.±
Freeboard 1 Ft.
Slopes: Upstream Face Vertical
Downstream Face 7¼ to 12
Width across top 5'

Concrete Arch Dam

DAM NO. 2-6-337-4

8.

Classification of Dam by Material:

Earth_____ Conc. Masonry X Stone Masonry_____

Timber_____ Rockfill_____ Other_____

Foundation on ledge.

9.

A. Description of present land usage downstream of dam:

100 % rural; _____ % urban

B. Is there a storage area or flood plain downstream of dam which could accommodate the impoundment in the event of a complete dam failure. yes X no_____

Downstream 2/3 mi. brook enters Mill River.

10.

Risk to life and property in event of complete failure.

No. of people 6 to 8

No. of homes 6 to 8

No. of businesses None

No. of industries None Type_____

No. of utilities Pole line Type_____

Railroads None on Roaring Brook.

Other dams None on Roaring Brook.

Other_____

11.

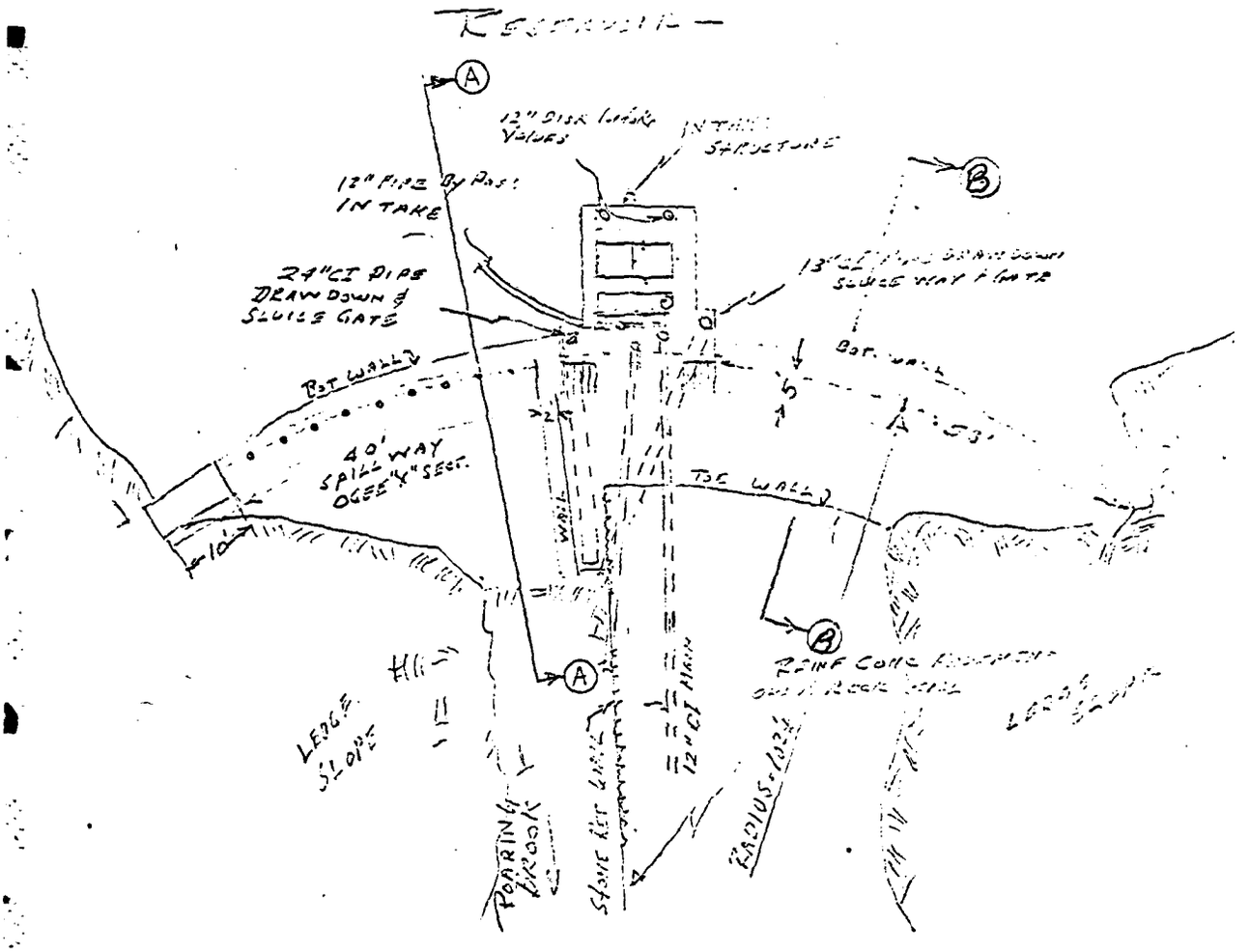
Attach Sketch of dam to this form showing section and plan on $8\frac{1}{2}$" x 11" sheet.

RCS/sd/vk

SKETCHES

SHEET No. 1 OF 3

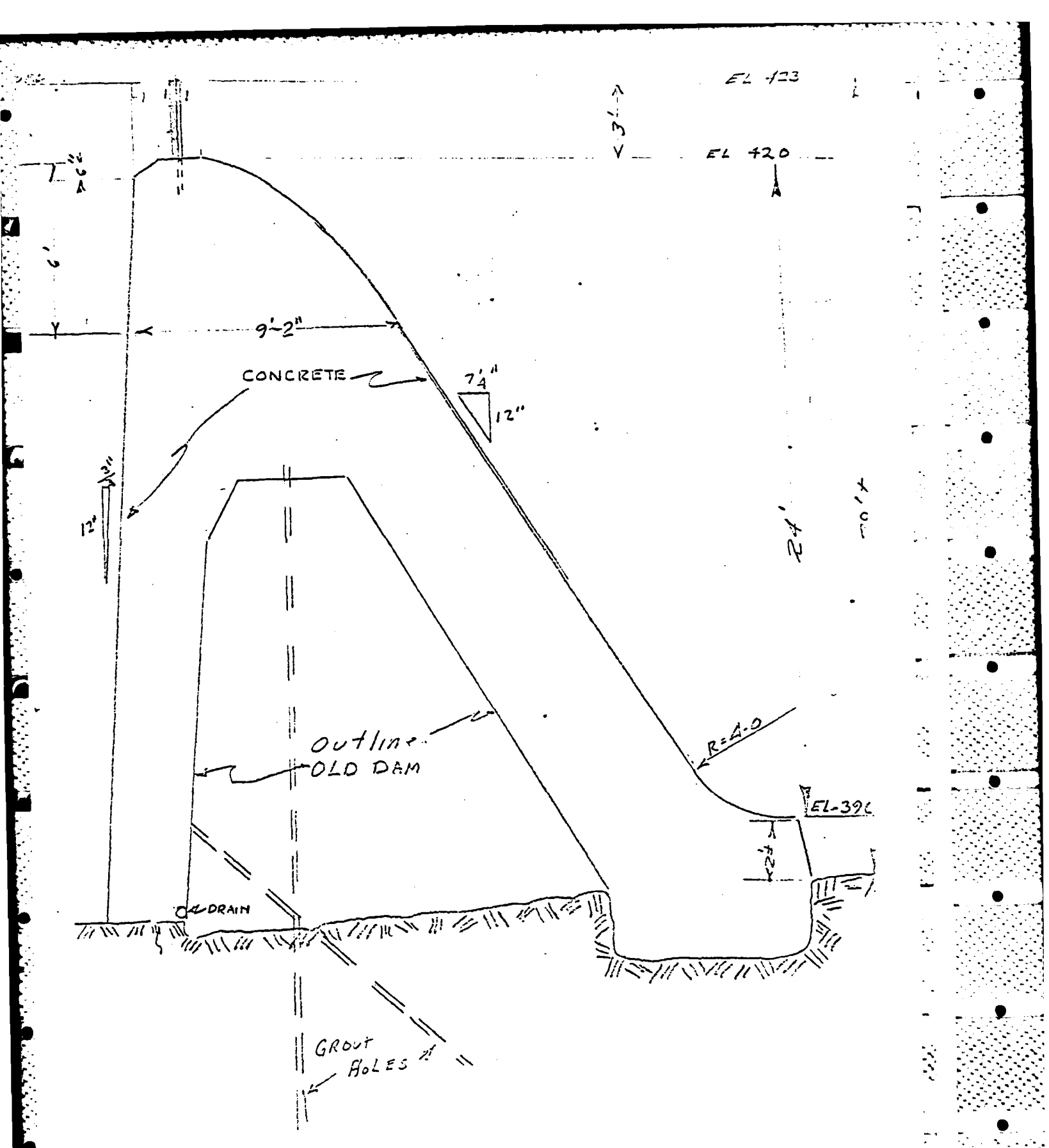
DAM No 2-C-38[illegible]



PLAN VIEW CONCRETE ARCH DAM 120'± LONG

TAKEN FROM PLANS IN WATER SUPPLY DISTRICT OFFICE

SCALE APROX. 1 INCH = 20 Feet.



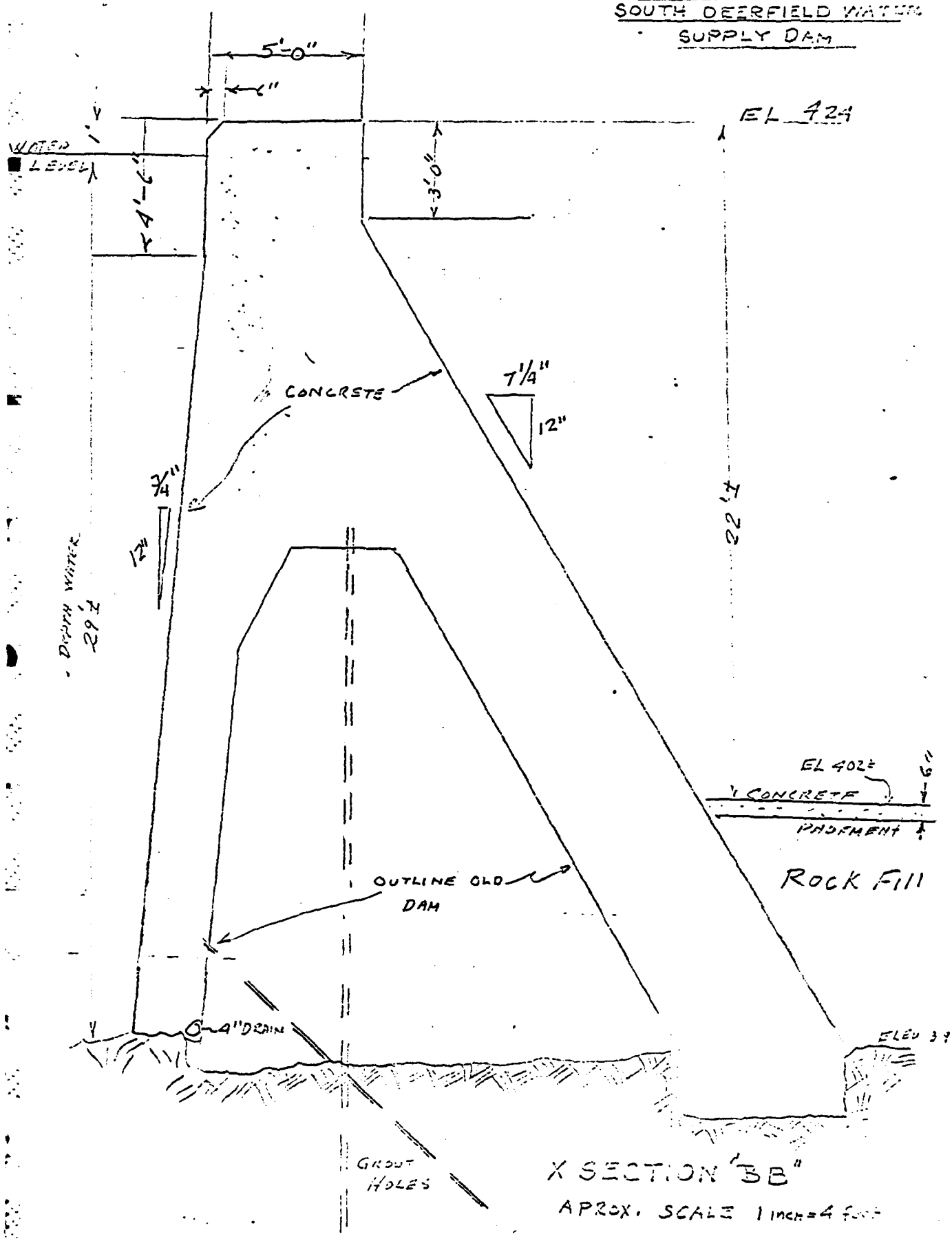
"X" SECTION "AA" THUR[illegible] SPILLWAY

TAKEN FROM WATER SUPPLY

DISTRICT OFFICE

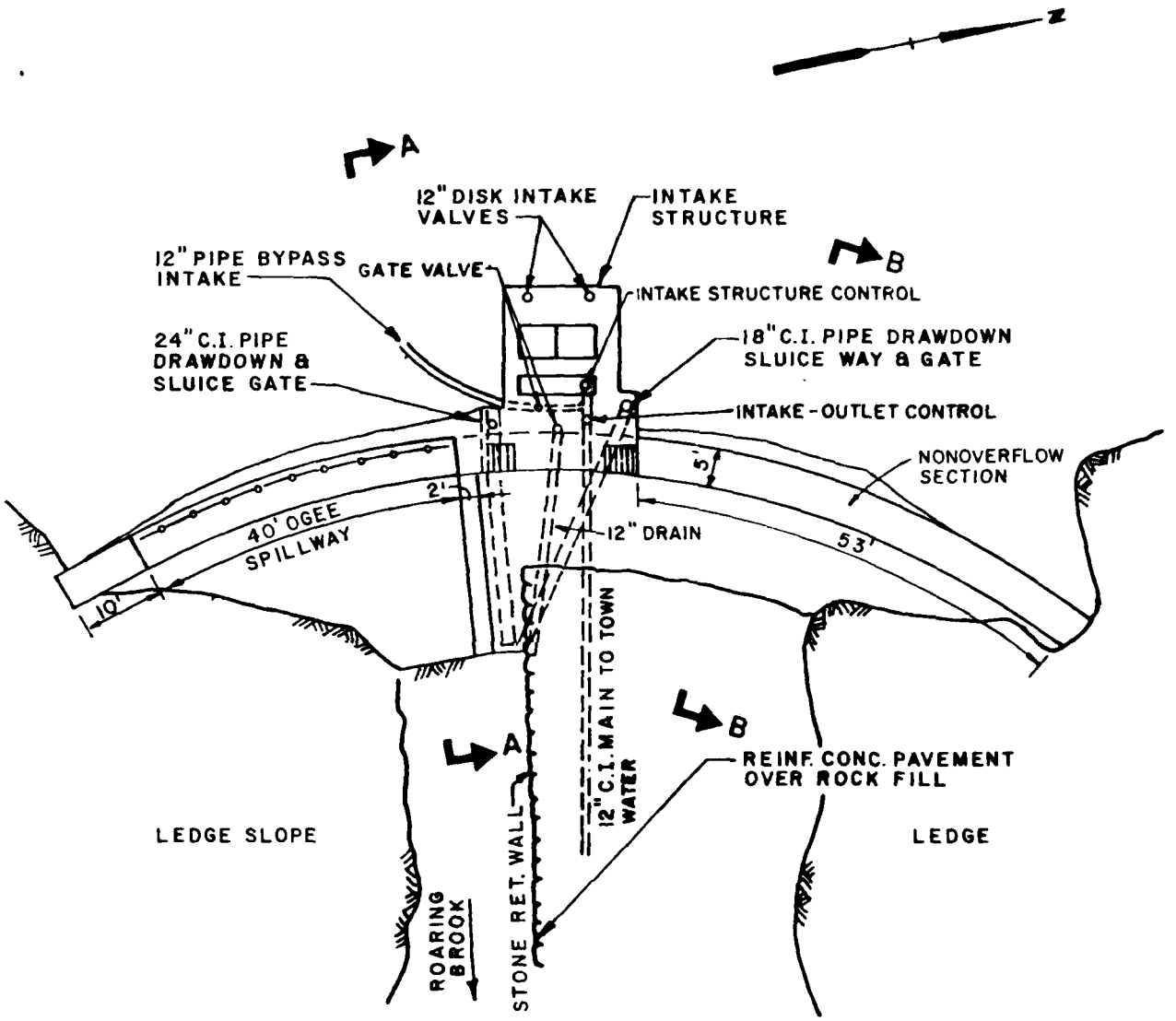
[illegible] Feet

SOUTH DEERFIELD WATER SUPPLY DAM

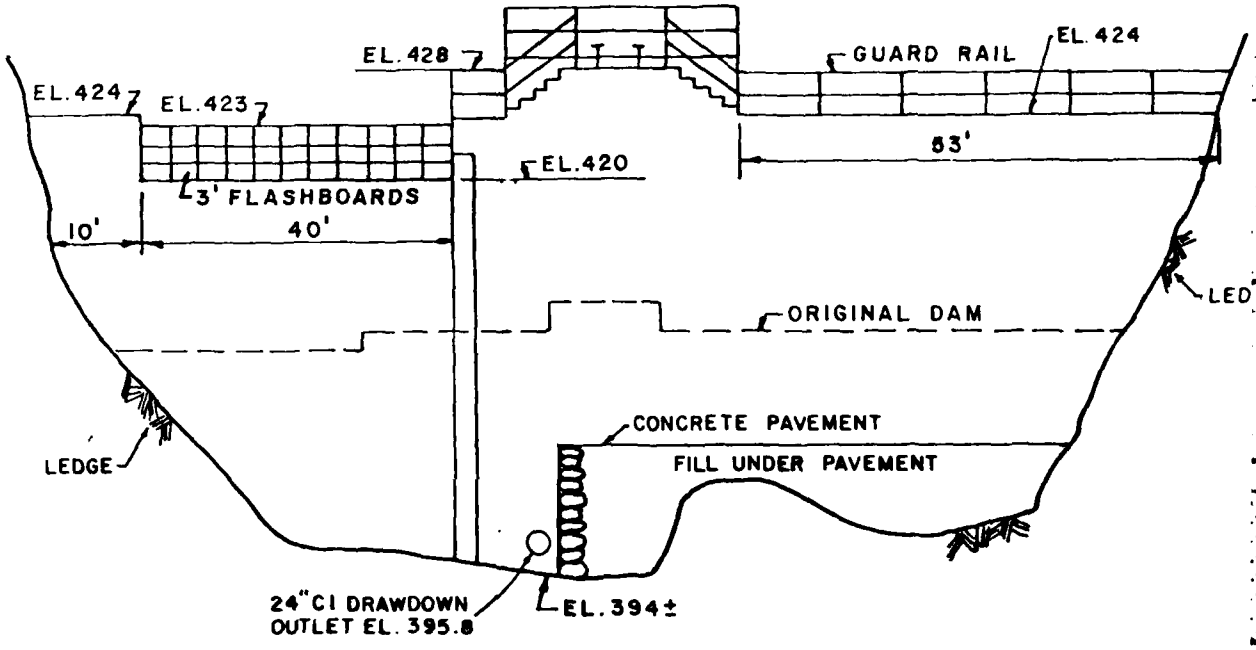


X SECTION "BB"

APROX. SCALE 1 inch = 4 feet



PLAN



ELEVATION

HAYDEN, HARDING & BUCHANAN, INC CONSULTING ENGINEERS BOSTON, MASSACHUSETTS	U.S. ARMY ENGINEER CORPS OF E WALTHAM

NATIONAL PROGRAM OF INSPECTION OF NO

SOUTH DEERFIELD WATER SUPPLY

WHATELY MA

INFORMATION SHOWN TAKEN FROM PLANS FOR DAM REVISIONS DATED 1953 AND STATE INSPECTION REPORTS.

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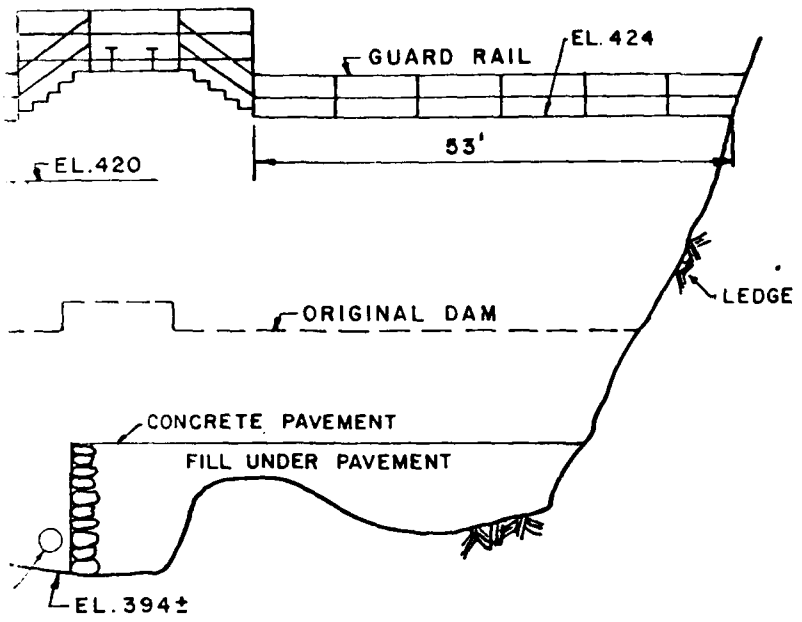


ELEVATION

HAYDEN, HARDING & BUCHANAN, INC CONSULTING ENGINEERS BOSTON, MASSACHUSETTS	U.S. ARMY ENGINEER DIV NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASS

NATIONAL PROGRAM OF INSPECTION OF NON-FED DAMS

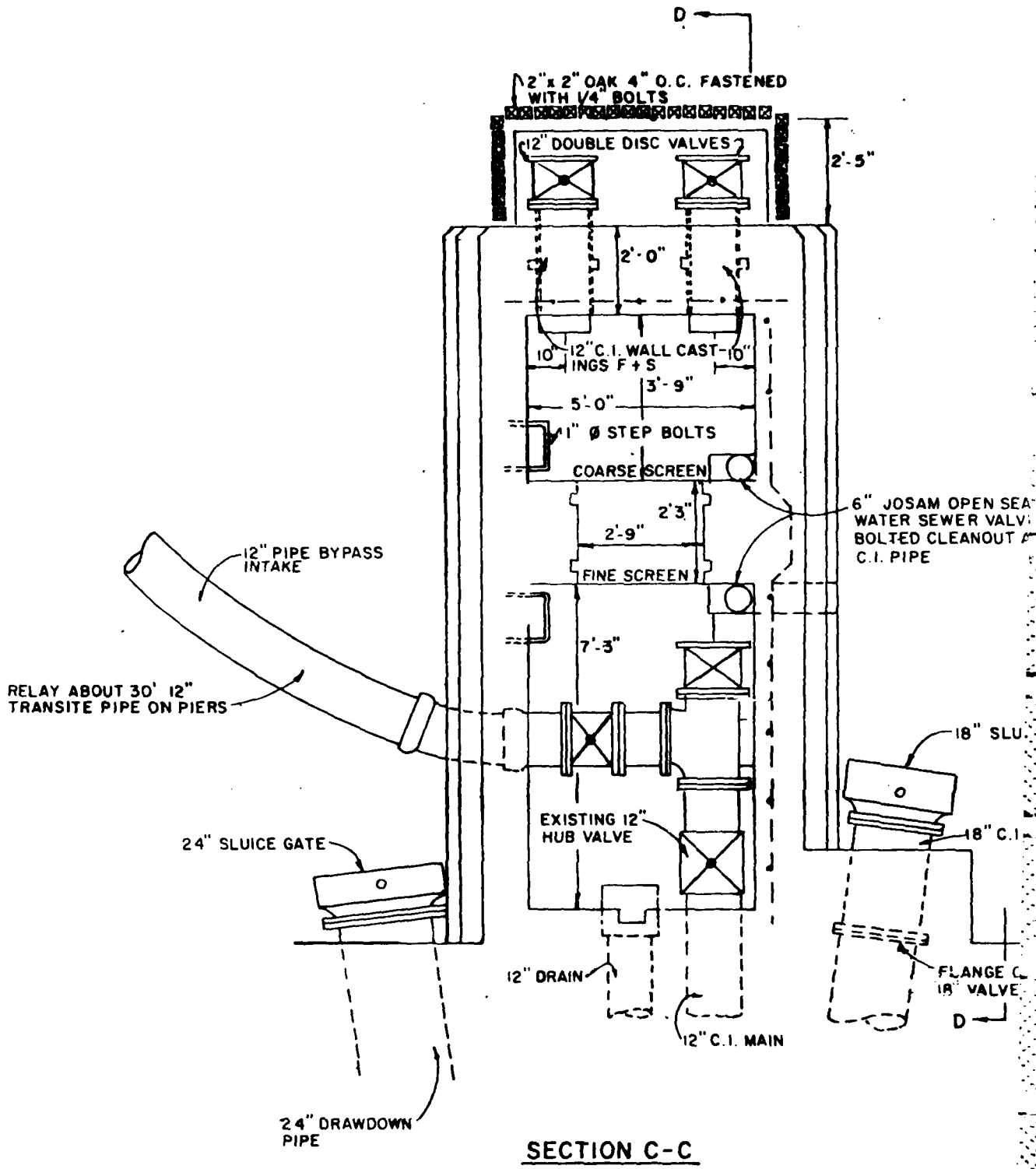
SOUTH DEERFIELD WATER SUPPLY DAM

WHATELY MASSACHUSETTS

SCALE: NOT TO SCALE

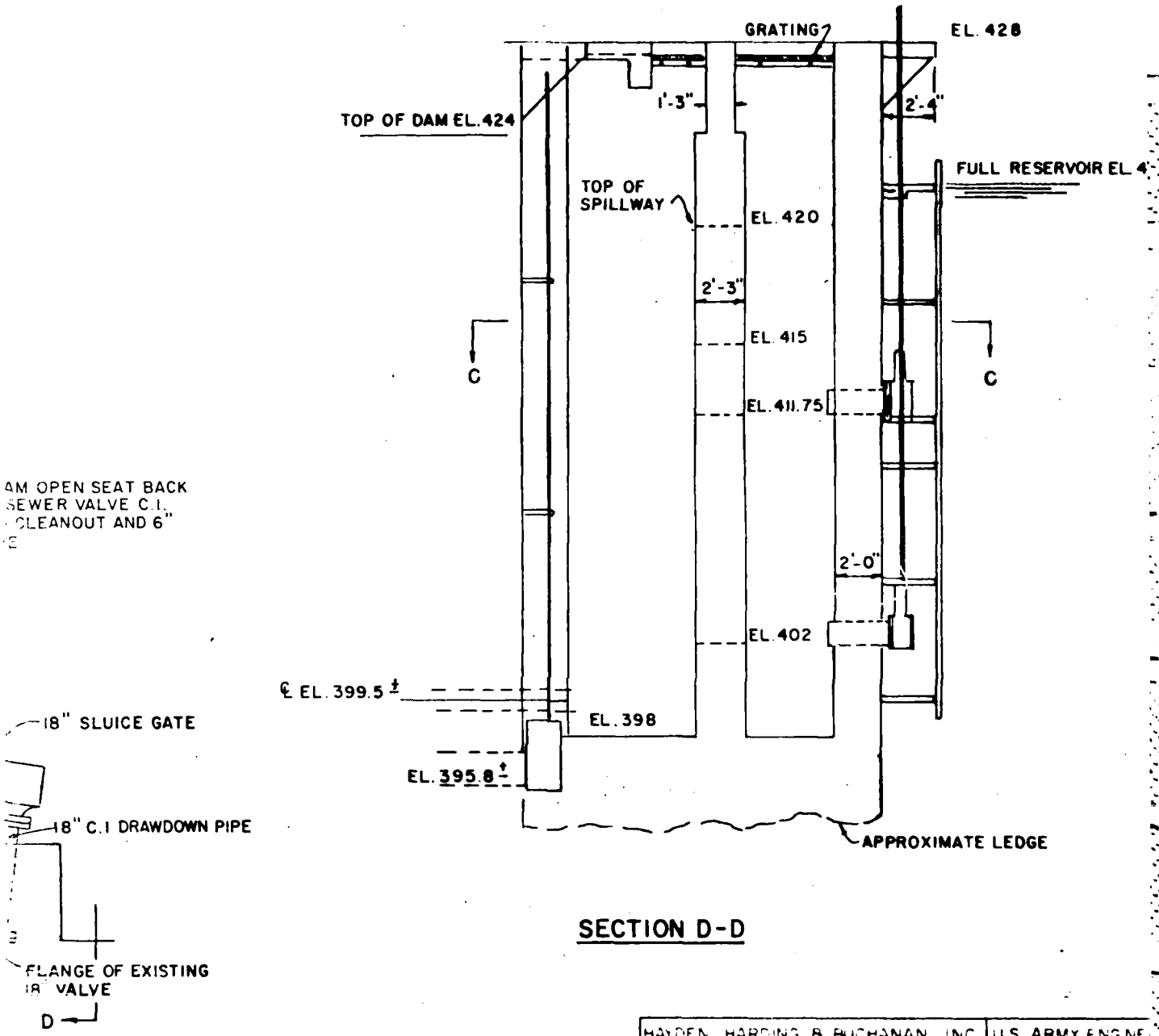
DATE: MAY, 1979

383



SECTION C-C

193



SECTION D-D

HAYDEN, HARDING & BUCHANAN, INC. CONSULTING ENGINEERS BOSTON, MASSACHUSETTS	U.S. ARMY ENGINE... CORPS OF... WALTH...

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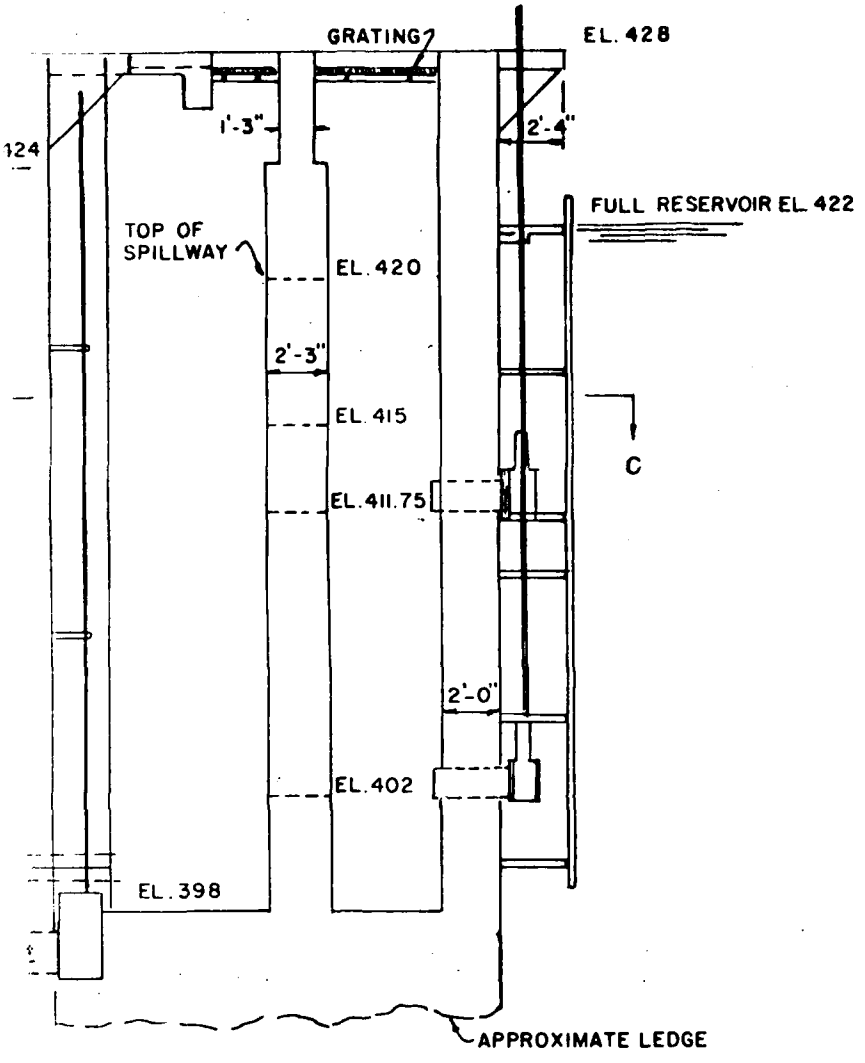

SECTION D-D

HAYDEN, HARDING & BUCHANAN, INC CONSULTING ENGINEERS BOSTON, MASSACHUSETTS	U.S. ARMY ENGINEER DIV. NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASS

NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS

SOUTH DEERFIELD WATER SUPPLY DAM

TAKEN FROM
1953 AND
PORTS.

WHATELY MASSACHUSETTS

SCALE NOT TO SCALE
DATE MAY, 1979

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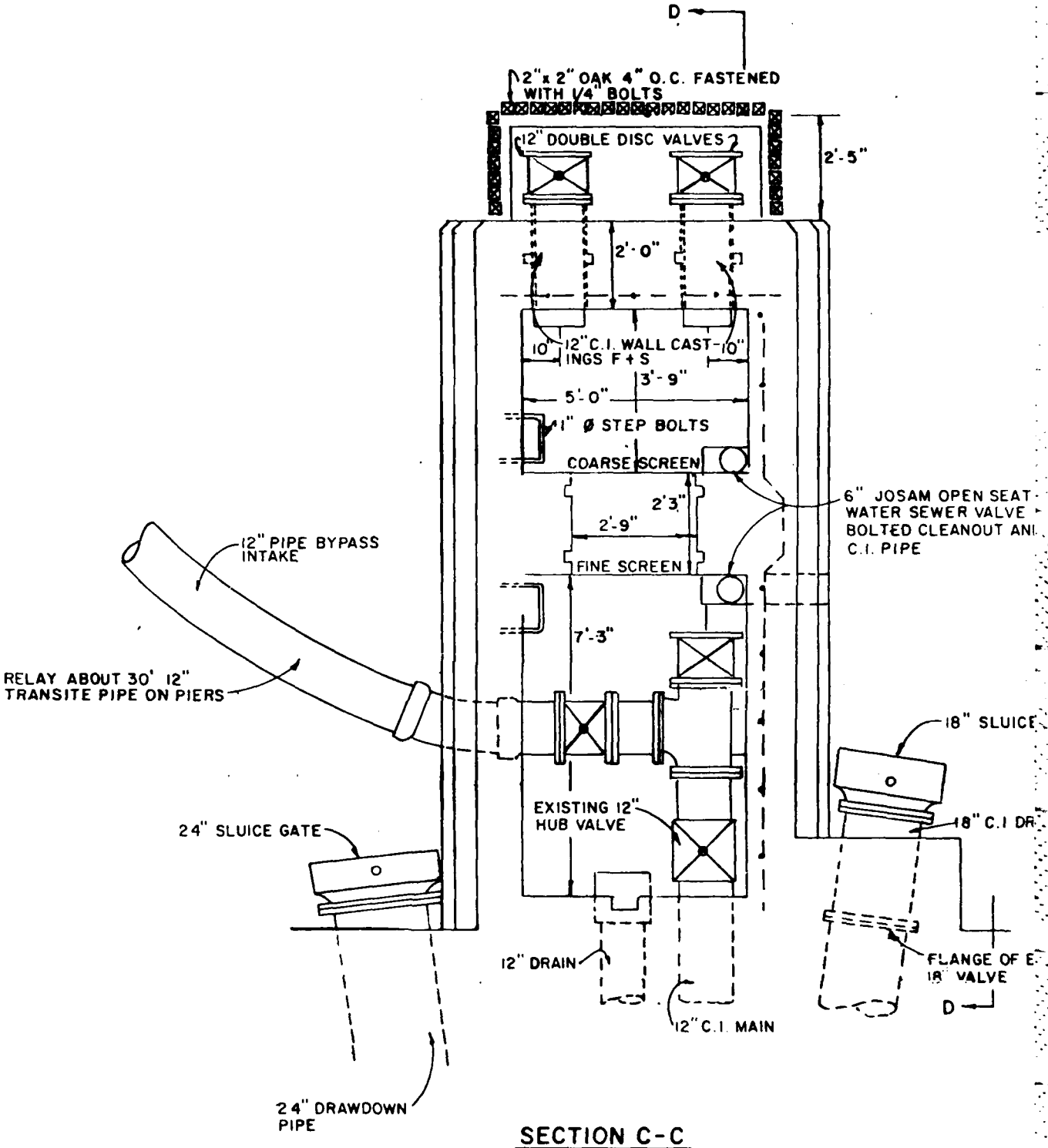
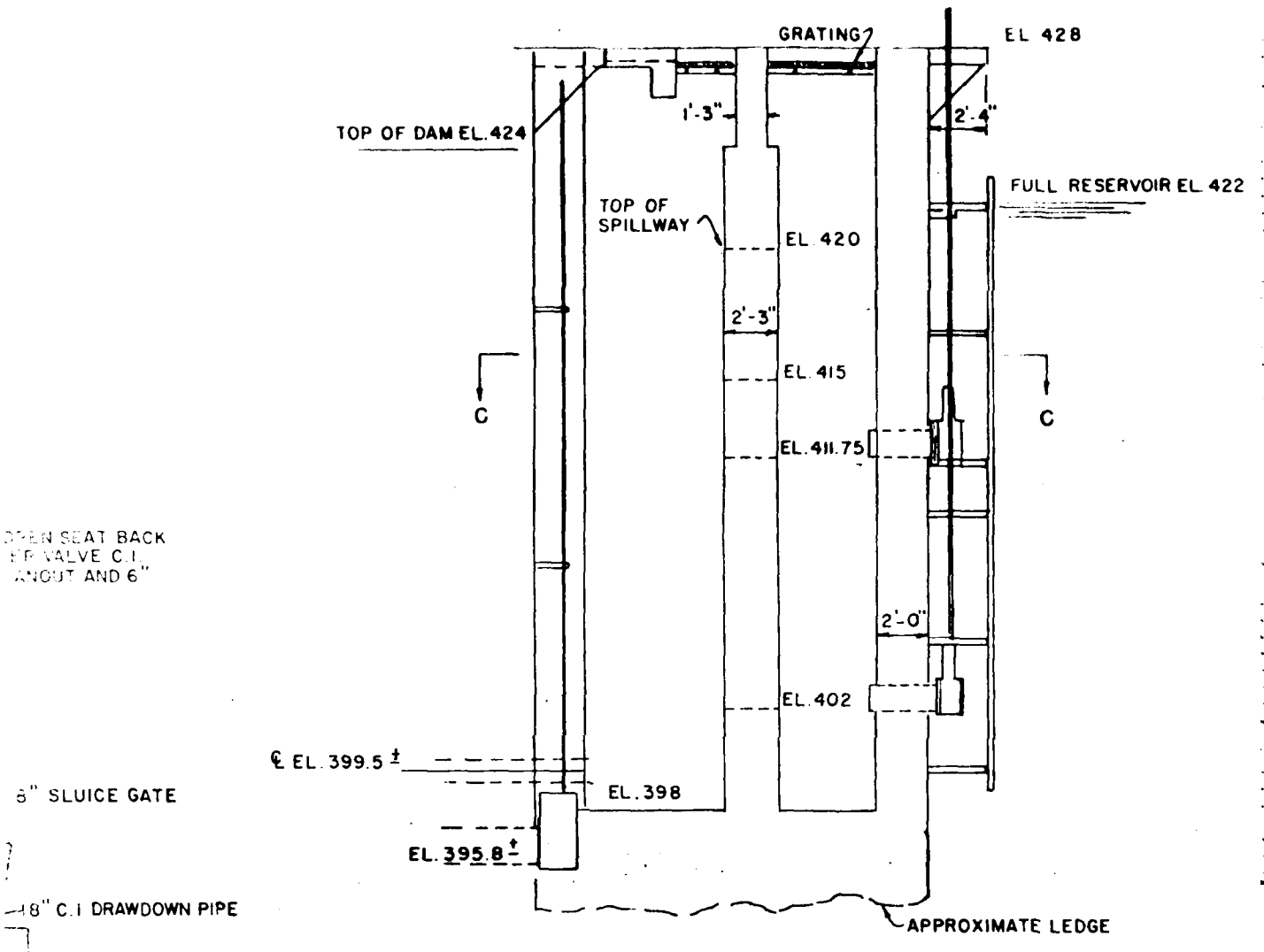


SECTION C-C



SECTION D-D

INFORMATION SHOWN TAKEN FROM DAM REVISIONS DATED 1953 AND STATE INSPECTION REPORTS.

HAYDEN, HARDING & BUCHANAN, INC. CONSULTING ENGINEERS BOSTON, MASSACHUSETTS	U.S. ARMY ENGINEER C CORPS OF EN WALTHAM,

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SOUTH DEERFIELD WATER SUPPL

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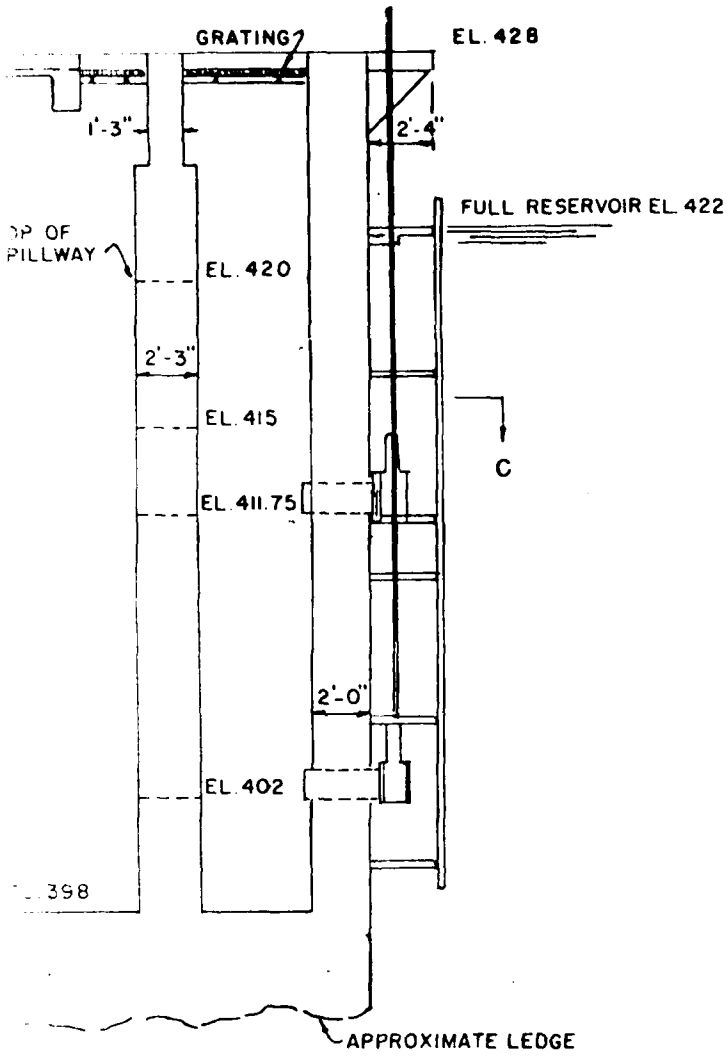

ECTION D-D

HARDING & BUCHANAN, INC. CONSULTING ENGINEERS BOSTON, MASSACHUSETTS	U.S. ARMY ENGINEER DIV. NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASS

NATIONAL PROGRAM OF INSPECTION OF NON-FED DAMS

SOUTH DEERFIELD WATER SUPPLY DAM

M

WHATELY MASSACHUSETTS

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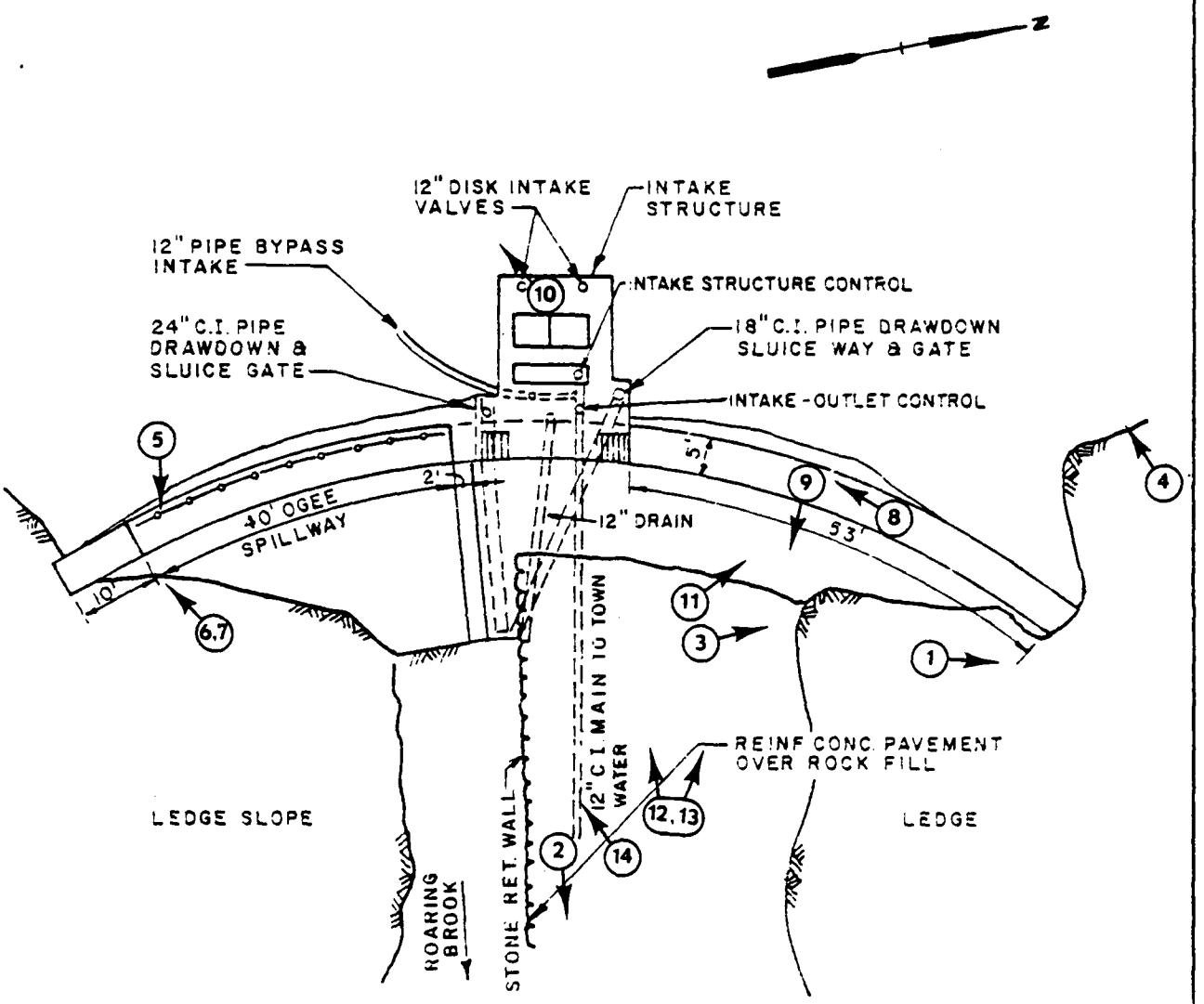
APPENDIX C

PHOTOGRAPHS



HAYDEN, HARDING & BUCHANAN, INC CONSULTING ENGINEERS BOSTON, MASSACHUSETTS	U.S. ARMY ENGINEER DIV. NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASS

NATIONAL PROGRAM OF INSPECTION OF NON-FED DAMS

LOCATION OF PHOTOGRAPHS
SOUTH DEERFIELD WATER SUPPLY

WHATELY MASSACHUSETTS

SCALE NOT TO SCALE

DATE MAY, 1979

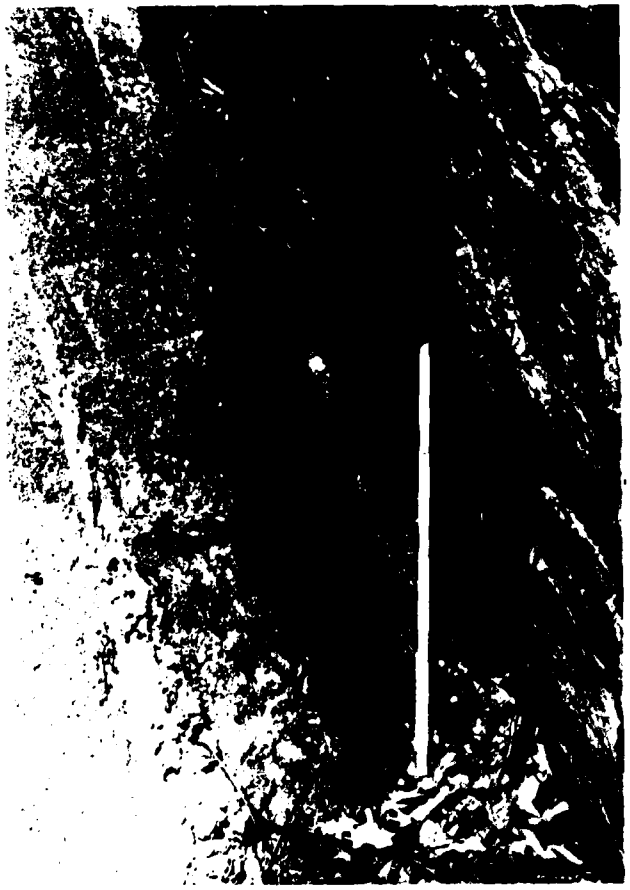


PHOTO NO. 1 - Seepage through contact of concrete dam and rock (schist) of left abutment approximately ten feet down from top of dam.

PHOTO NO. 2 - Downstream channel as viewed from dam.

PHOTO NO. 3 - Contact between dam and left abutment.

PHOTO NO. 4 - Overall view of crest from left abutment

PHOTO NO. 5 - Seepage through joints in rock forming right abutment, downstream of spillway.

PHOTO NO. 6 - Close-up view of seepage shown in PHOTO NO. 5

PHOTO NO. 7 - Close-up view of seepage shown in PHOTO NO. 5

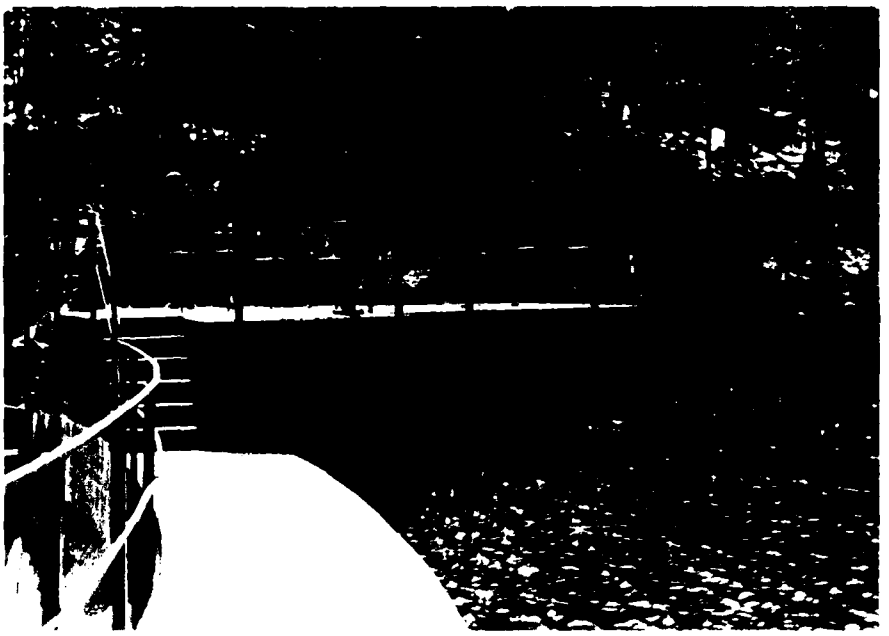


PHOTO NO. 8 - Intake structure and controls viewed from left abutment.

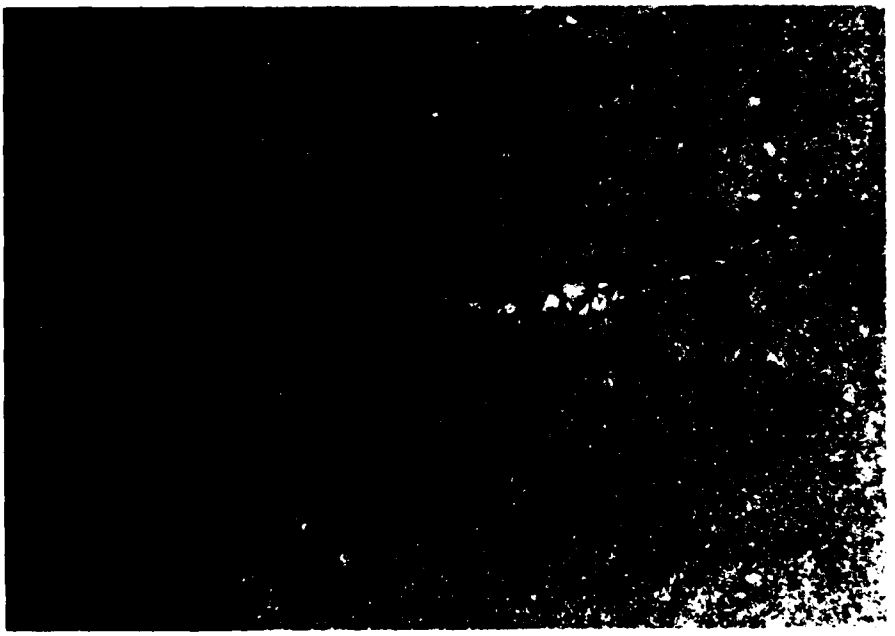
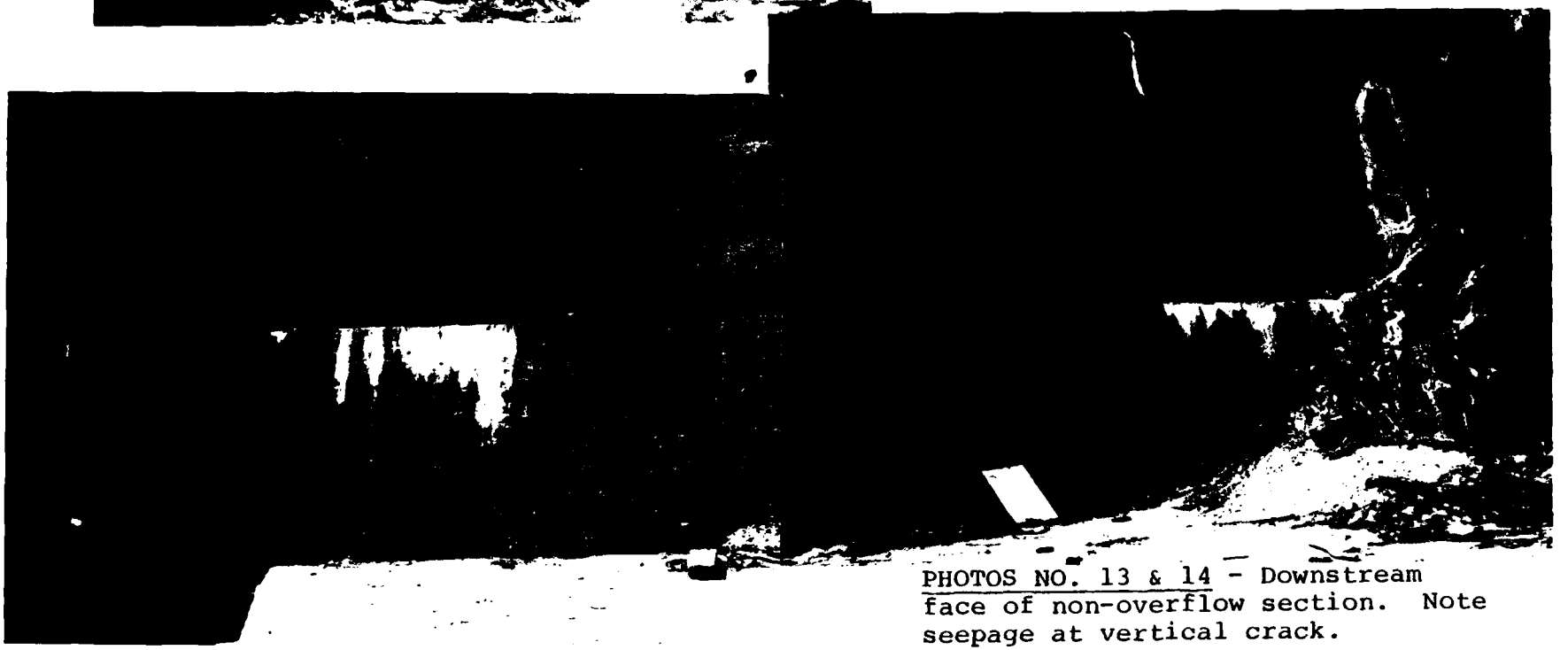


PHOTO NO. 9 - Crack in non-overflow section extending through top of crest..

PHOTO NO. 10 - Upstream reservoir viewed from intake structure.

PHOTO NO. 11 - Close-up view of vertical crack in non-overflow section.

PHOTO NO. 12 - Downstream face of spillway.



PHOTOS NO. 13 & 14 - Downstream face of non-overflow section. Note seepage at vertical crack.

APPENDIX D

HYDROLOGIC AND HYDRAULIC COMPUTATIONS

HAYDEN, HARDING & BUCHANAN, INC.
CONSULTING ENGINEERS
BOSTON, MASSACHUSETTS

First water supply dam built prior to 1940. In 1953, redesigned and enlarged. Design by Winslow C. Wentworth, Turners Falls, Mass. Design calcs are available.

Hydraulic Height = 28 ft
Storage = 23.± a-f
Pond Area = 4.5 a
Ave Depth = 12. F

Concrete Arch dam, w/ 40' OGEE Spillway 4' high, 3' Flashboard depth

Drainage Area ≈ 5.04 s.m. or 3,226±a (rolling-mountainous)
Size Class = Small

Hazard Potential = Low, There are homes near North St, 4,000±f d.s., which might be damaged by dam failure flooding, depending on elevations.

1953 design used 24 hour, 8" rainfall with peak runoff of 215 cfs/s.m. or 1080 cfs

Spillway will pass 1150± cfs w/o flashboards Orginal deign indicated Southampton Res designed for 1000 cfs/s.m. but concluded this flow not likely at this location. A flow of 5×1000 = 5000±cfs would flow over the dam crest to a depth of about 5ft.± entire crest designed to act as overflow spillway. Corps guide lines indicate a test flood range of the 50 to 100 year storm for this site. The 100 year flows are justified for d.s. development risks due to dam failure.

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PDD 2/6/79

HH&B HAYDEN, HARDING & BUCHANAN, INC
CONSULTING ENGINEERS
BOSTON MASSACHUSETTS

SHEET NO. 2
JOB Dams
SUBJECT So. Deerfld
CLIENT Corp

In the 1960's a 60' high dam was built 4500' upstream of this site. It is used for water supply. It intercepts runoff from 67% of of the drainage area. The So. Deerfld direct drainage area is now 1.7± s.m.

Test Flood

Direct Runoff = $2250 \times 1.7 \times \frac{1}{4} = 956$

Upper dam discharge = $2100 \times 3.3 \times \frac{1}{4} \times \frac{1}{4} = 433$

100 year storm = 1389
say 1400 cfs

No flashboards

$Q_{P_1} = 1400$ $El_1 = 425\pm$ $Stor_1 = 12.5$ a-f, 0.13"±

$Q_{P_2} = 1400 \cdot \left(1 - \frac{0.13}{12.5}\right) = 1384$ cfs (reduction not significant)

Due to low stor let $Q_{P_3} = Q_{P_1} = 1400$ cfs.

3' Flashboards Inflow = outflow = 1400 cfs

Tailwater

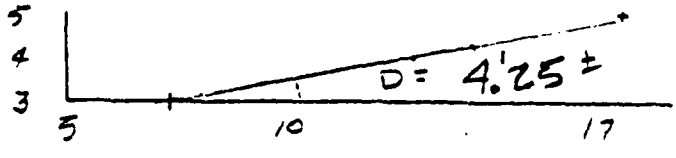
$Q = 1400$

$n = 0.075$

$S = \frac{6}{75} = 0.08$

$K = 5.6$

D	A	WP	$R^{2/3}$	K	V	Q
5	125	32	2.49	5.6	13.95	1744.
3	70	28	1.85	"	10.35	724.

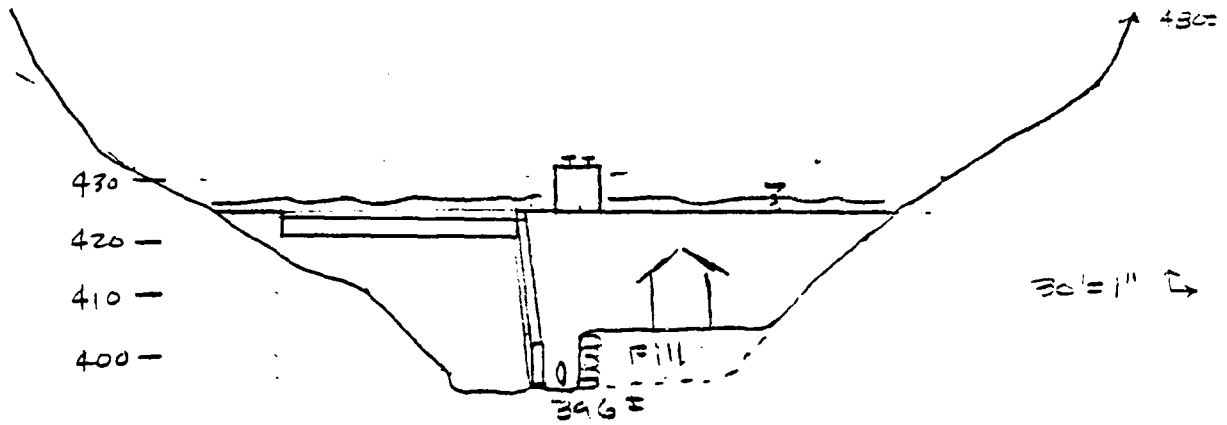


Tailwater ≈ 4.25'
Elev ≈ 401±

JOB NO. 78.274.1
DATE 2-5-79
BY MA
CH'D BY FDD 2/16/79

HH&B HAYDEN, HARDING & BUCHANAN, INC.
CONSULTING ENGINEERS
BOSTON MASSACHUSETTS

SHEET NO 3
JOB Dams
SUBJECT Seismic
CLIENT Corps



Elev of Dam

424 Topdam
-396 channel
28 ft

Failure Analysis

Assume dam full w/ flashboards in place

$Q_F = 8/27 (0.4 \times 75)(\sqrt{32.2})(28)^{1.5} = 7473.\pm$ cfs

River valley will be flooded d.s., however there is no development until North St, 4000'± d.s. Here, road may be flooded but no homes damaged. Beyond road is large swamp/field area.

AD-A155 579 NATIONAL PROGRAM FOR INSPECTION OF NON-FEDERAL DAMS 2/2
SOUTH DEERFIELD (MA 0.. (U) CORPS OF ENGINEERS WALTHAM
MA NEW ENGLAND DIV JUN 79

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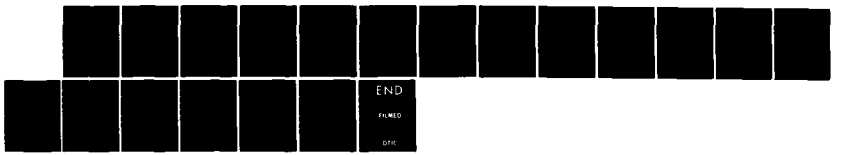

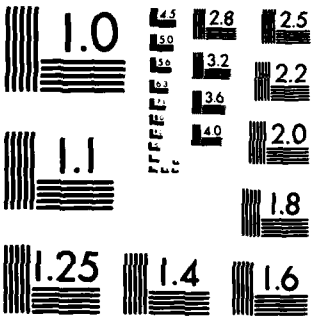

MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS 1963-A

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DP 2/6/79

HH&B HAYDEN, HARDING & BUCHANAN, INC.
CONSULTING ENGINEERS
BOSTON, MASSACHUSETTS

SHEET NO. 4
JOB Dams
SUBJECT So. Deerfield
CLIENT Corps

Storage

Elev.	D	Area	Ave Area	Stor	Accum Stor
					a-f
400	0	0.5	—	—	—
410	10	1	0.75	7.5	7.5
420	10	2	1.5	15.	22.5 spillway
424	4	2.75	2.39	9.6	32.1 Top of Dam
430	6	4	3.4	20.25	52.35

Low Spillway 4'x 40' (elev 220 to 224) with out flashboards

El	D	C	L	$H^{3/2}$	Q
221	1	3.1	40'	1.0	124
222	2	3.3	"	2.82	372
223	3	3.5	"	5.2	728
224	4	3.6	40'	8.0	1152 cfs

Entire Dam Crest (above 224)

	D	C	L	$H^{3/2}$	Q
224					0
224.5	0.5	2.68	106	0.35	100
225	1.0	2.68	106	1	284
226	2.0	2.65	106	2.83	795
227	3.0	2.66	106	5.2	1466

Flow w/ 3' flshbrds in place

Q_T	Elev
124.	224
350	224.5
656	225
1523	226
2618	227

78.244.1
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MW
FDD 2/6/79

HH&B HAYDEN, HARDING & BUCHANAN, INC.
CONSULTING ENGINEERS
BOSTON MASSACHUSETTS

SHEET NO 5
JOB Dams
SUBJECT So. Silver -
CLIENT Corps

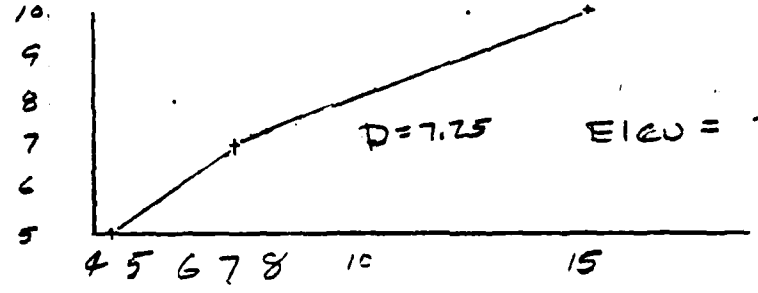
Std 5+00 d.s.

$n = 0.075$

$S = \frac{50}{450} = 0.111$

$Q_{P_1} = 7473$ cfs

D	A	WP	$R^{2/3}$	K	V	Q
5.'	250	60	2.61 ·	6.6 ·	17.2 ·	4,307. ·
10.'	650	100	3.51 ·	"	23.1 ·	15,035. ·
7.'	380	80	2.84 ·	"	18.75 ·	7124. ·



$Q_{P_1} = 7473$ $\quad Stor = \frac{425 \times 500}{43560} = 4.9$ a-f

Q_{P_2} $7473 \times \left(1 - \frac{4.9}{32.1}\right) = 6,332.$ cfs $\quad D = 6.5$

$Stor = \frac{380+400}{2}\left(\frac{500}{43560}\right)$

$= 4.51''$

$Q_{P_3} = 7473\left(1 - \frac{4.7}{32.1}\right) = 6,379.$ cfs

P.294.1
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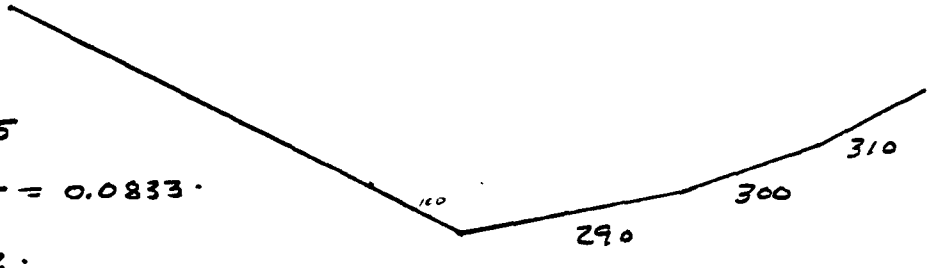
FDD 2/7/79

HH&B HAYDEN, HARDING & BUCHANAN, INC.
CONSULTING ENGINEERS
BOSTON MASSACHUSETTS

SHEET NO. 6
JOB Dams
SUBJECT So. Deerfld
CLIENT Corps

Sta 11+00 d.s.



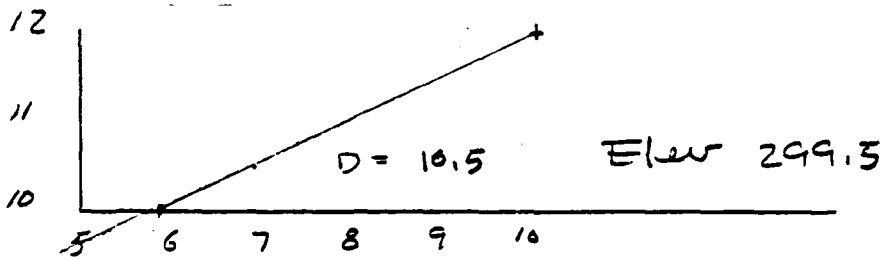
$n = 0.075$

$S = \frac{50}{600} = 0.0833$

$K = 5.72$

$Q_{P_1} = 6973$ cfs

D	A	WP	$R^{2/3}$	K	V	Q
10'	360	75	2.86	5.72	16.36	5,890.
12'	510	80	3.46	5.72	19.79	10,092.



$Q_{P_1} = 6379$ cfs, $Sto_1 = \frac{400+420}{2}\left(\frac{600}{43560}\right) = 5.65$ a.f.

$Q_{P_2} = 6379\left(1 - \frac{5.65}{32.1}\right) = 5256$

$Sto_2 = \frac{780(600)}{43560} = 5.23$

$Q_{P_3} = 6379\left(1 - \frac{5.44}{32.1}\right) = 5300\pm$ cfs

JOB NO. 78.244.1
DATE 2-2-79
BY MA
CH'D BY FDD 2/7/79

HH&B HAYDEN, HARDING & BUCHANAN, INC.
CONSULTING ENGINEERS
BOSTON MASSACHUSETTS

SHEET NO. 7
JOB Dams
SUBJECT So. Deerfield
CLIENT Corps

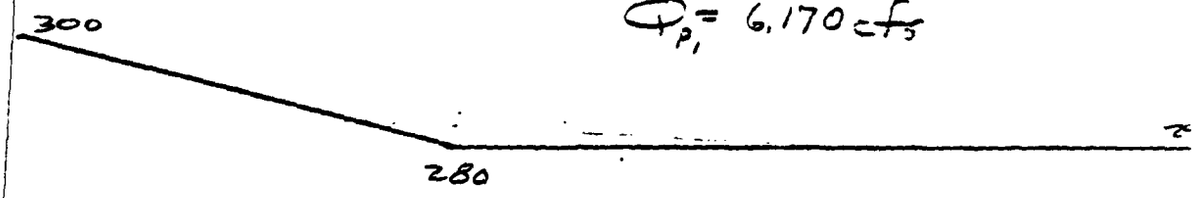
Sta 17+00

$n = 0.075$

$S = \frac{10}{600} = 0.01667$

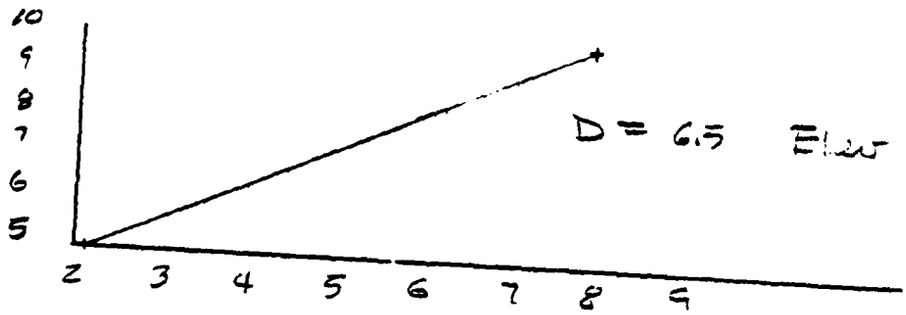
$K = 2.5579$

$Q_{P_1} = 6,170$ cfs



1225

D	A	WP	$R^{2/3}$	K	V	Q
10'	1125	230	2.9	2.56	7.41	8343
5'	325	80	2.56	"	6.54	2126



D = 6.5 Elev 286.5

$Q_{P_1} = 5300$ cfs $\quad Storage_1 = \frac{305 + 420}{2}\left(\frac{600}{43560}\right) = 3.99$

$Q_{P_2} = 5300 \cdot \left(1 - \frac{8.99}{32.1}\right) = 3814$ cfs

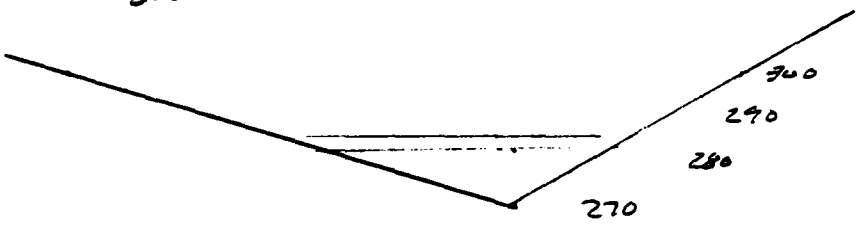
$Storage_2 = \frac{605 + 420}{2}\left(\frac{300}{43560}\right) = 7.06$

$Q_{P_3} = 5300 \cdot \left(1 - \frac{8.03}{32.1}\right) = 3974$ cfs

Std 20+00 d.s.

$n = 0.075$ $K = 3.617$

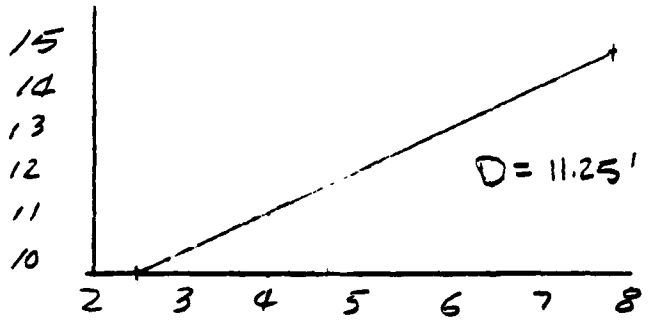
$S = \frac{10}{300} = 0.033$



40' = 1"

$Q_{P_1} = 4628$ =

D	A	WP	$R^{2/3}$	K	V	Q
10'	250	55	2.77	3.62	9.9	2496
15'	575	80	3.75	"	13.6	7803



D = 11.25' EL = 281.25

$Q_{P_1} = 3974$ cfs $Stor_1 = \frac{360 + 745}{2}\left(\frac{3[illegible]}{4356}\right) = 3.81$ a

$Q_{P_2} = 3974 \left(1 - \frac{3.81}{32.1}\right) = 3{,}502\pm$ cfs

$Stor_2 = \frac{330 + 745}{2}\left(\quad\right) = 3.70$

$Q_{P_3} = 3974 \left(1 - \frac{3.76}{32.1}\right) = 3{,}809.\pm$

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BOSTON MASSACHUSETTS

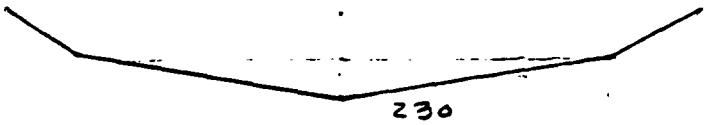
Sta 30+00 d/s.

$Q_{P_1} = 4086$ cfs

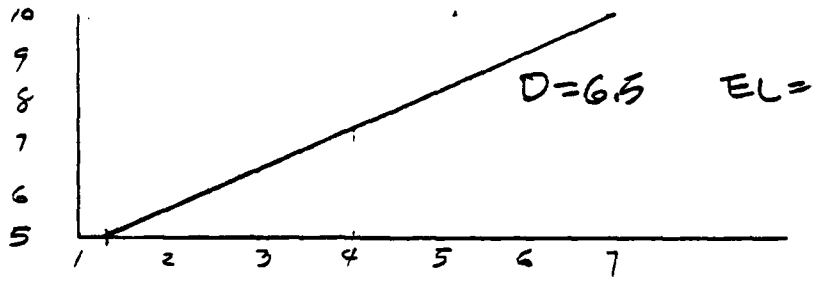
$El = 230$ $\quad K = \frac{1.486}{.075}(.04)^{.5} = 3.96$.

$n = 0.075$

$S = \frac{40}{1000} = 0.04$.



D	A	WP	$R^{2/3}$	K	V	Q
10'	600	120	2.94	3.96	11.64	6985
5'	176	70	1.85	"	7.34	1293



$Q_{P_1} = 3809$ $\quad Sta_1 = \frac{390+360}{2}\left(\frac{1000}{43560}\right) = 8.61$

$Q_{12} = 3809\left(1 - \frac{8.61}{32.1}\right) = 2,787.$ cfs

$Sta_2 = \frac{300+360}{2}(\quad) = 7.58$

$Q_{P_3} = 3809\left(1 - \frac{8.1}{32.1}\right) = 2,848.$ cfs

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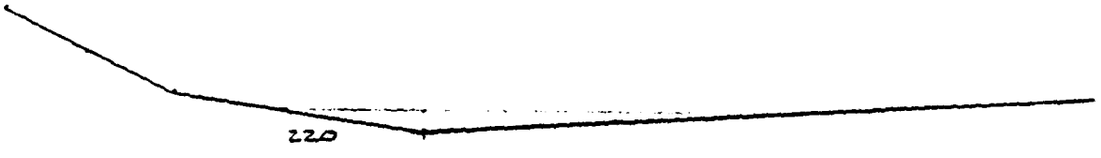
Sta 33+00 ds

$n = 0.075$

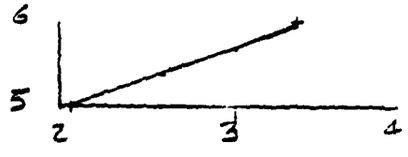
$S = \frac{10}{300} = 0.033''$

$K = \frac{1.486}{.075}(.033)^{.5} = 3.62.$



$Q_{P_1} = 3055.$

D	A	WP	$R^{2/3}$	K	V	Q
5	300	120	1.85	3.62	6.69	2007
6	425	130	2.21	"	8	3402



D = 5.8 EL = 226 ±

$Q_R = 2848$ $\quad Stor_1 = \frac{390 \cdot 390}{2}\left(\frac{300}{43560}\right) = 2.69$ a-f

$Q_{P_2} = 2848\left(1 - \frac{2.69}{32.1}\right) = 2609$ cfs

$Stor_2 = \frac{360 + 390}{2}\left(\frac{3}{435.6}\right) = 2.58$

$Q_{P_3} = 2848\left(1 - \frac{2.64}{32.1}\right) = 2614$ cfs

JOB NO. 78,244.1
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HH&B HAYDEN, HARDING & BUCHANAN, INC.
CONSULTING ENGINEERS
BOSTON MASSACHUSETTS

SHEET NO. 11
JOB Dams
SUBJECT So. Deerfld
CLIENT Corps

Sta 40+00 d.s.

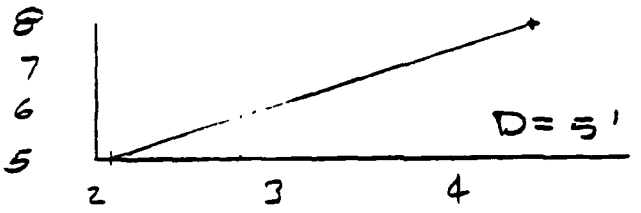
$n = 0.075$

$S = \frac{18}{700} = 0.026'''$

$K = \frac{1.486}{.075}(.026)^{.5} = 3.18.$

D	A	WP	$R^{2/3}$	K	V	Q
8	700	250	1.99.	3.18	6.33	4438.
3'	143	100	1.27	"	4.04	578.
5'	373	160	1.76	"	5.61	2091.

$Q_{P_1} = 2,809$ cfs



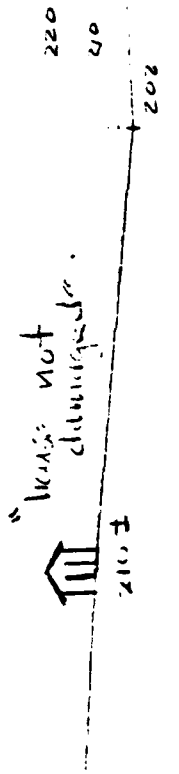
D = 5' EL = 207 ±

$Q_{P_1} = 2614$ $Stor_1 = \frac{485+390}{2}\left(\frac{700}{43560}\right) = 7.03$

$Q_{P_2} = 2614\left(1 - \frac{7.03}{32.1}\right) = 2,042 \pm$

$Stor_2 = 6.19$

$Q_{P_3} = 2614\left(1 - \frac{6.61}{32.1}\right) = 2,076.$



NO. 78.244.1
E 2-5-79
MA
BY FDD 2/7/79

HH&B HAYDEN, HARDING & BUCHANAN, INC.
CONSULTING ENGINEERS
BOSTON MASSACHUSETTS

SHEET NO. 12
JOB Adams
SUBJECT So. Deerfield
CLIENT Corps

Sta 41+00 d.s.

$Q = C L H^{3/2}$

$Q_{P_1} = 2096$

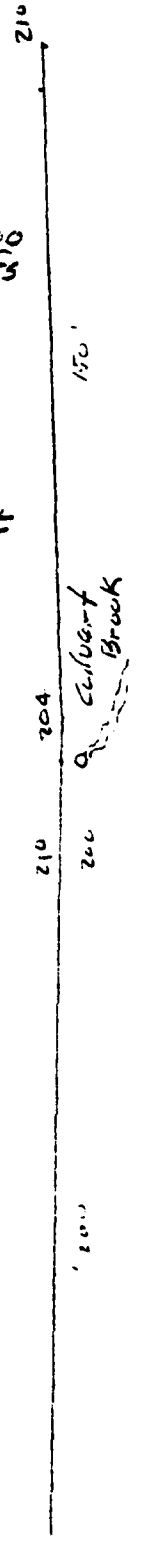
$Q_{bridge} \simeq 400$ cfs

D	C	L	$H^{3/2}$	Q
1	2.63	80 sub	1.	210.
2	"	160 "	2828.	1190.
3	2.63	300 "	5.2.	4100.
2.5	"	230 "	3.95.	2391.

2→2.5' ±

Elev = 206. ±

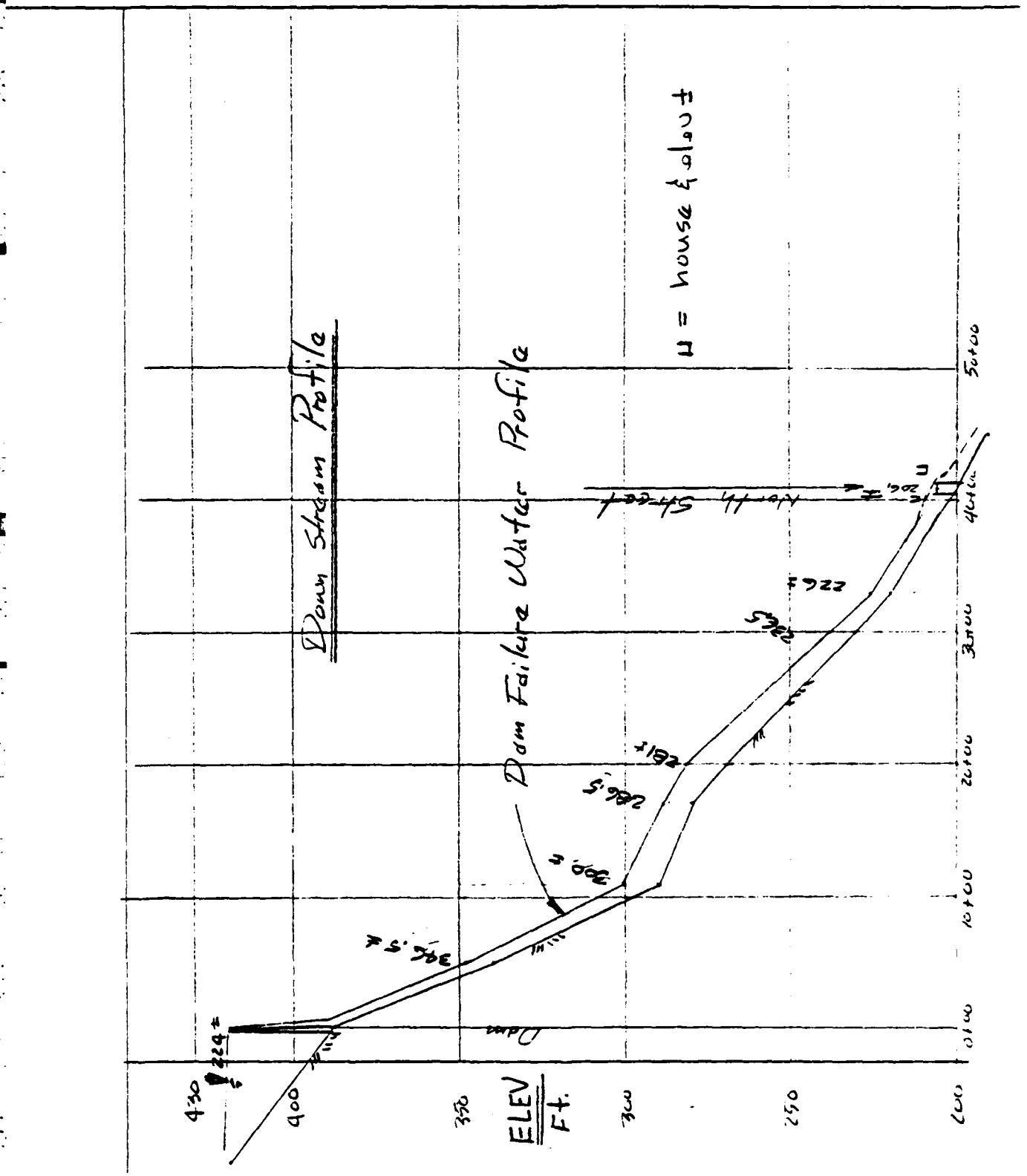
will cause back-water @ Sta 40+00



JOB NO. 78,244.1
DATE 2-5-79
BY MA
CH'D BY FDD 2/7/79

HH&B HAYDEN, HARDING & BUCHANAN, INC.
CONSULTING ENGINEERS
BOSTON, MASSACHUSETTS

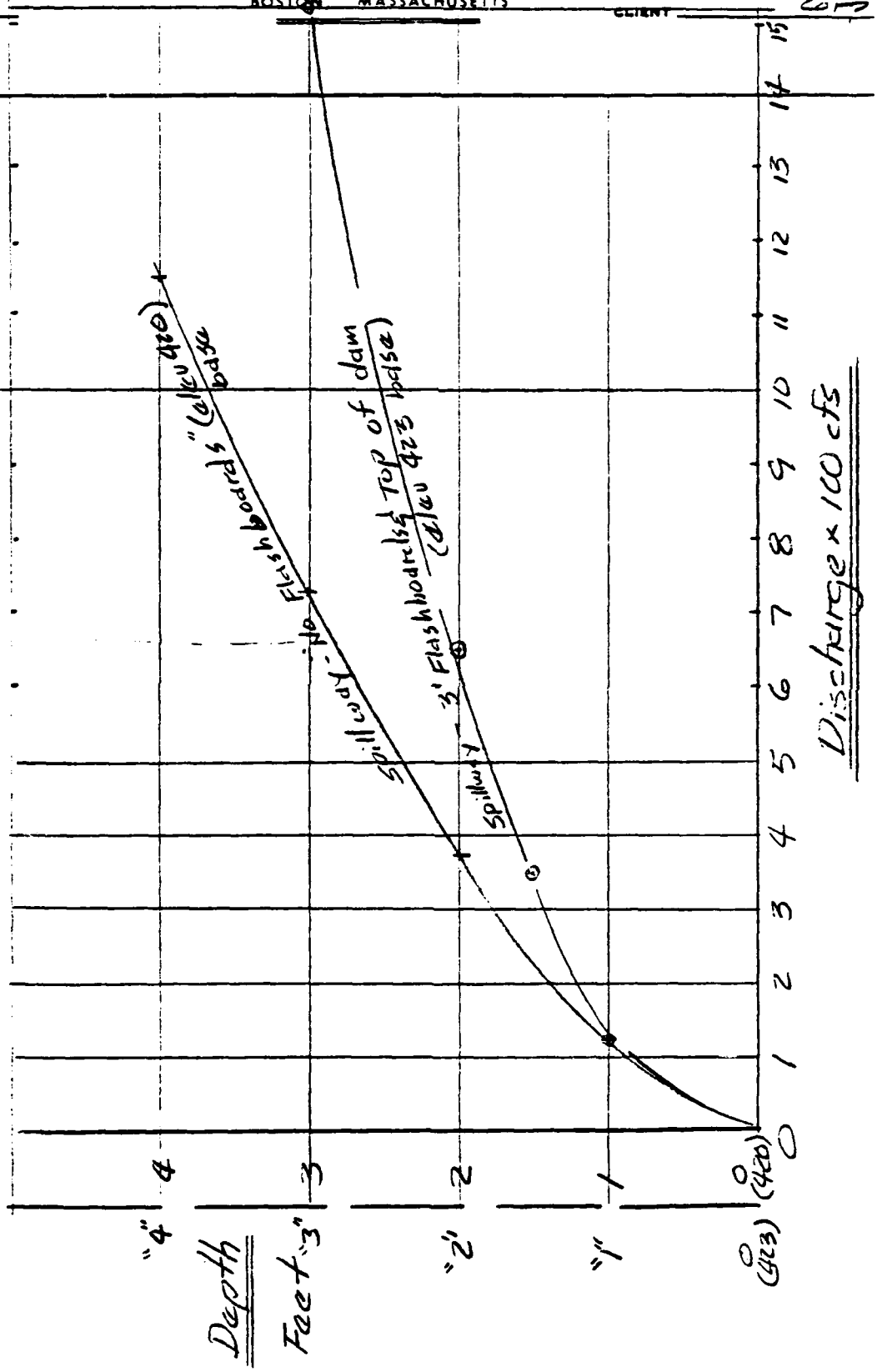
SHEET NO. 12
JOB Dam 2
SUBJECT So. Deerfield
CLIENT Corps



NO. 78.244.1
E 6-14-79
MA
D BY JJL

HH&B HAYDEN, HARDING & BUCHANAN, INC.
CONSULTING ENGINEERS
BOSTON MASSACHUSETTS

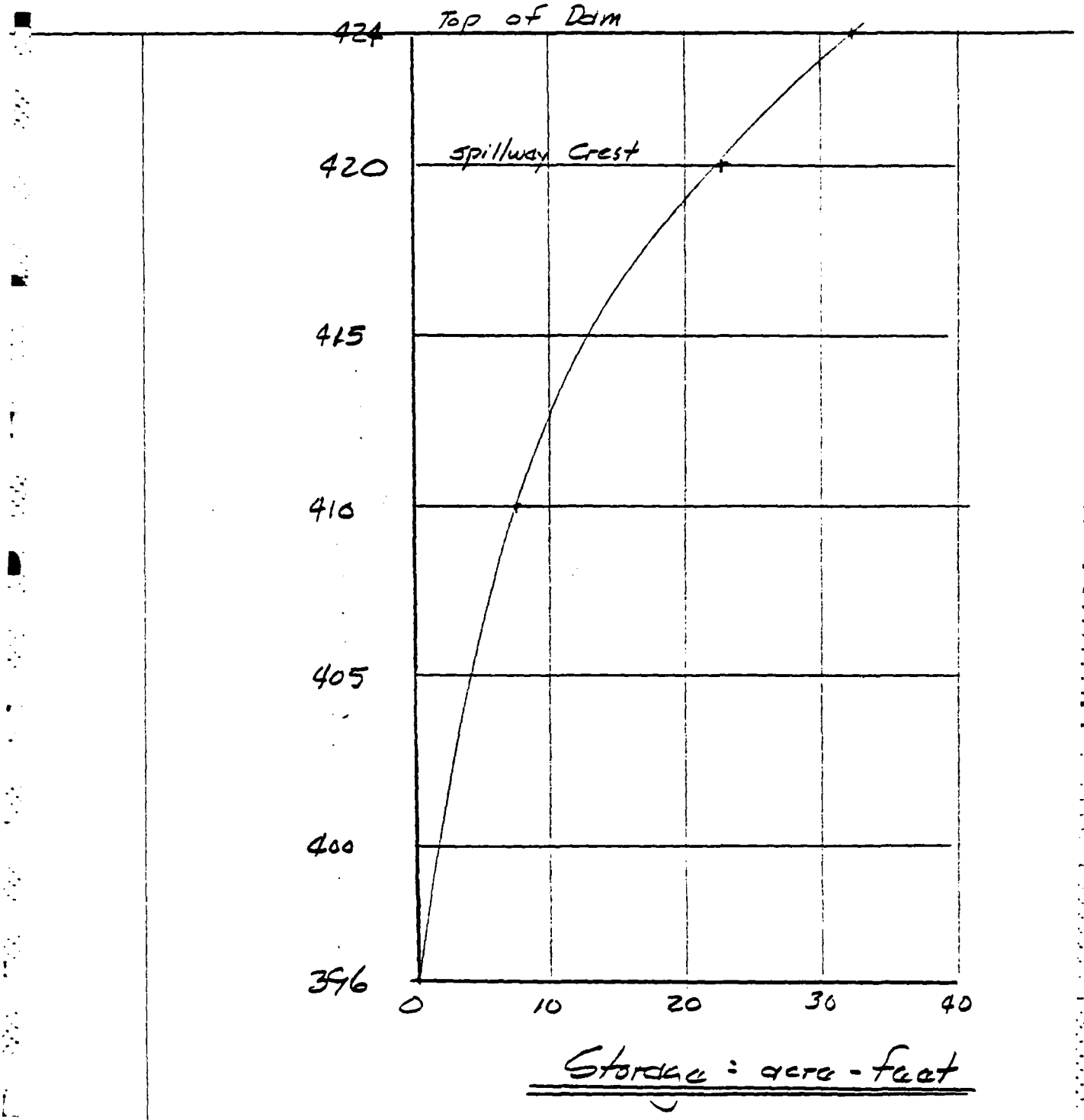
SHEET NO. 14
JOB Dams
SUBJECT So. Deerfield
CLIENT COE

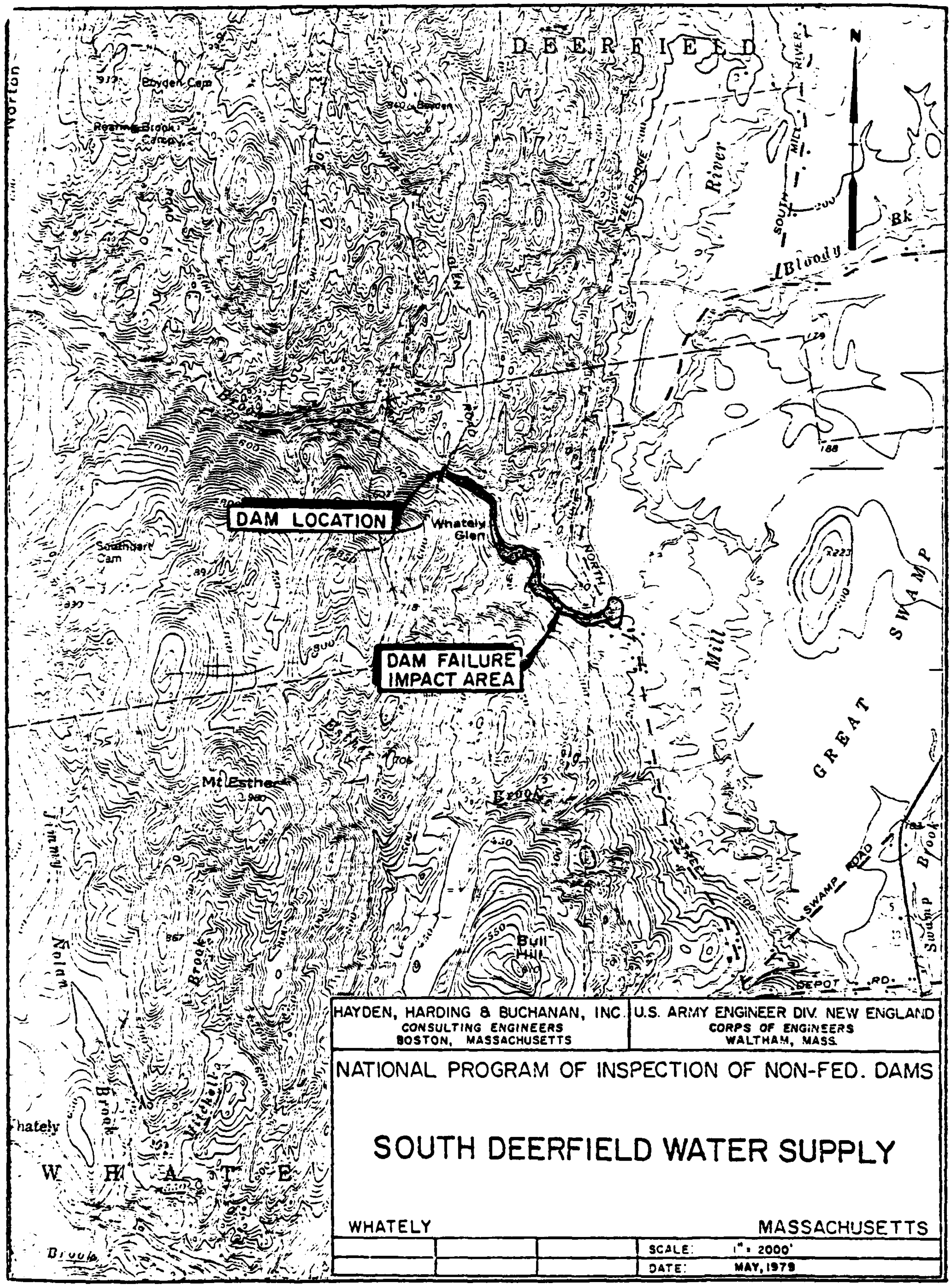


JOB NO. 78.244.1
DATE 6/14/79
BY mc
CH'D BY DBV

HH&B HAYDEN, HARDING & BUCHANAN, INC.
CONSULTING ENGINEERS
BOSTON, MASSACHUSETTS

SHEET NO. 15
JOB Dams
SUBJECT Sodletic
CLIENT Corps





HAYDEN, HARDING & BUCHANAN, INC. CONSULTING ENGINEERS BOSTON, MASSACHUSETTS	U.S. ARMY ENGINEER DIV. NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASS.

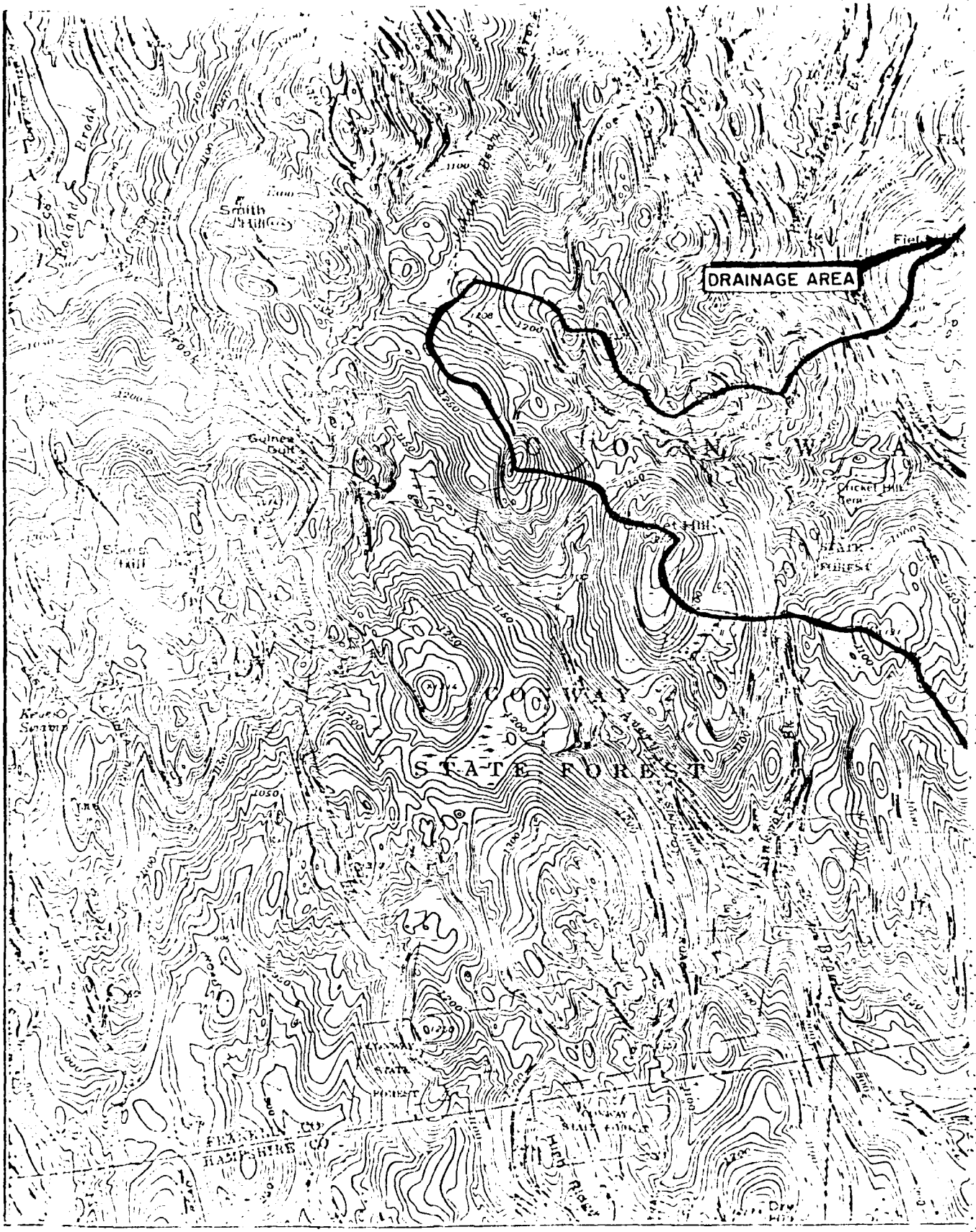
NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS

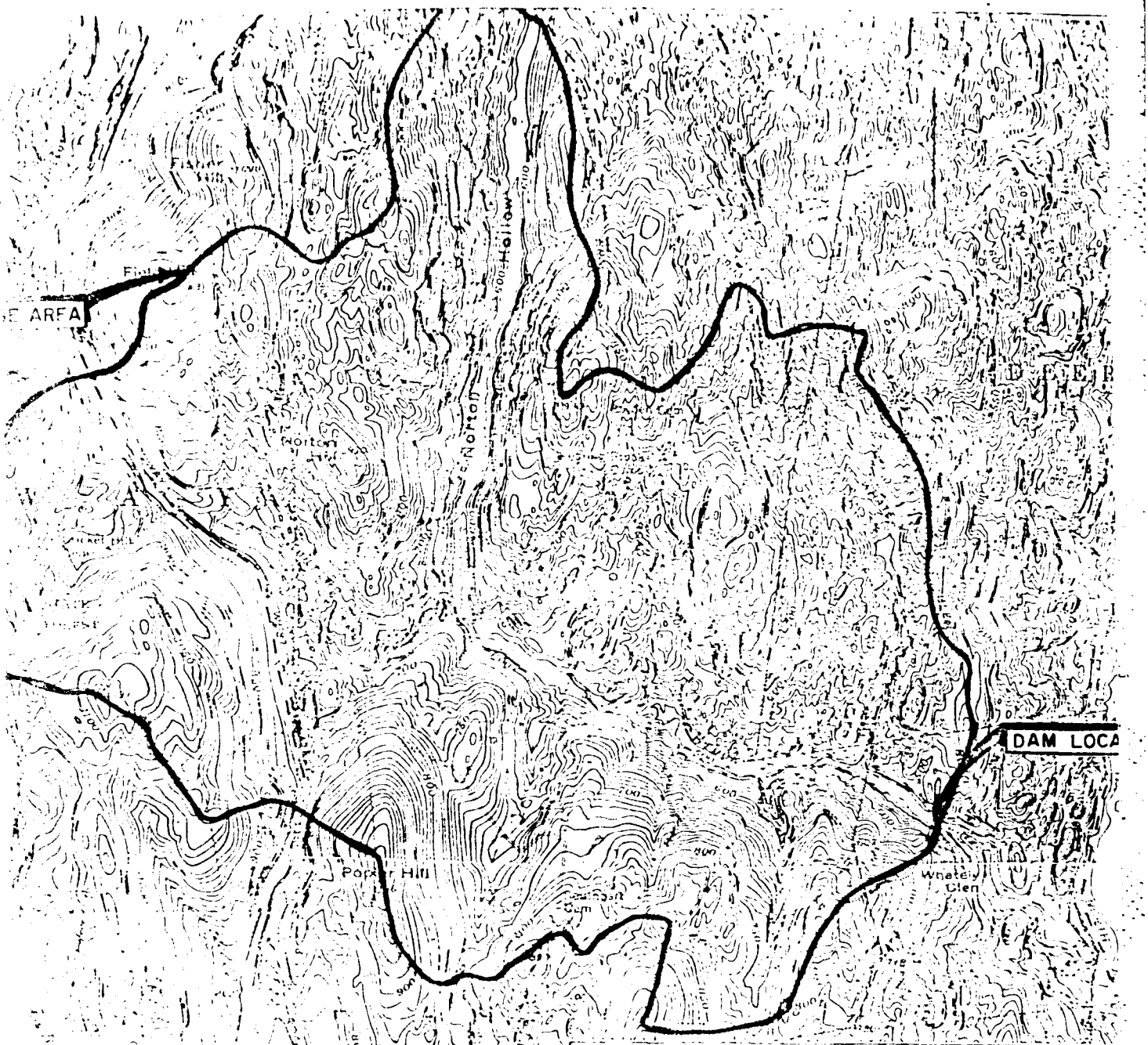
SOUTH DEERFIELD WATER SUPPLY

WHATELY MASSACHUSETTS

SCALE: 1" = 2000'

DATE: MAY, 1979





HAYDEN, HARDING & BUCHANAN, INC
CONSULTING ENGINEERS
BOSTON, MASSACHUSETTS

U.S ARMY ENGINEER DIV NEW
CORPS OF ENGINEERS
WALTHAM, MASS

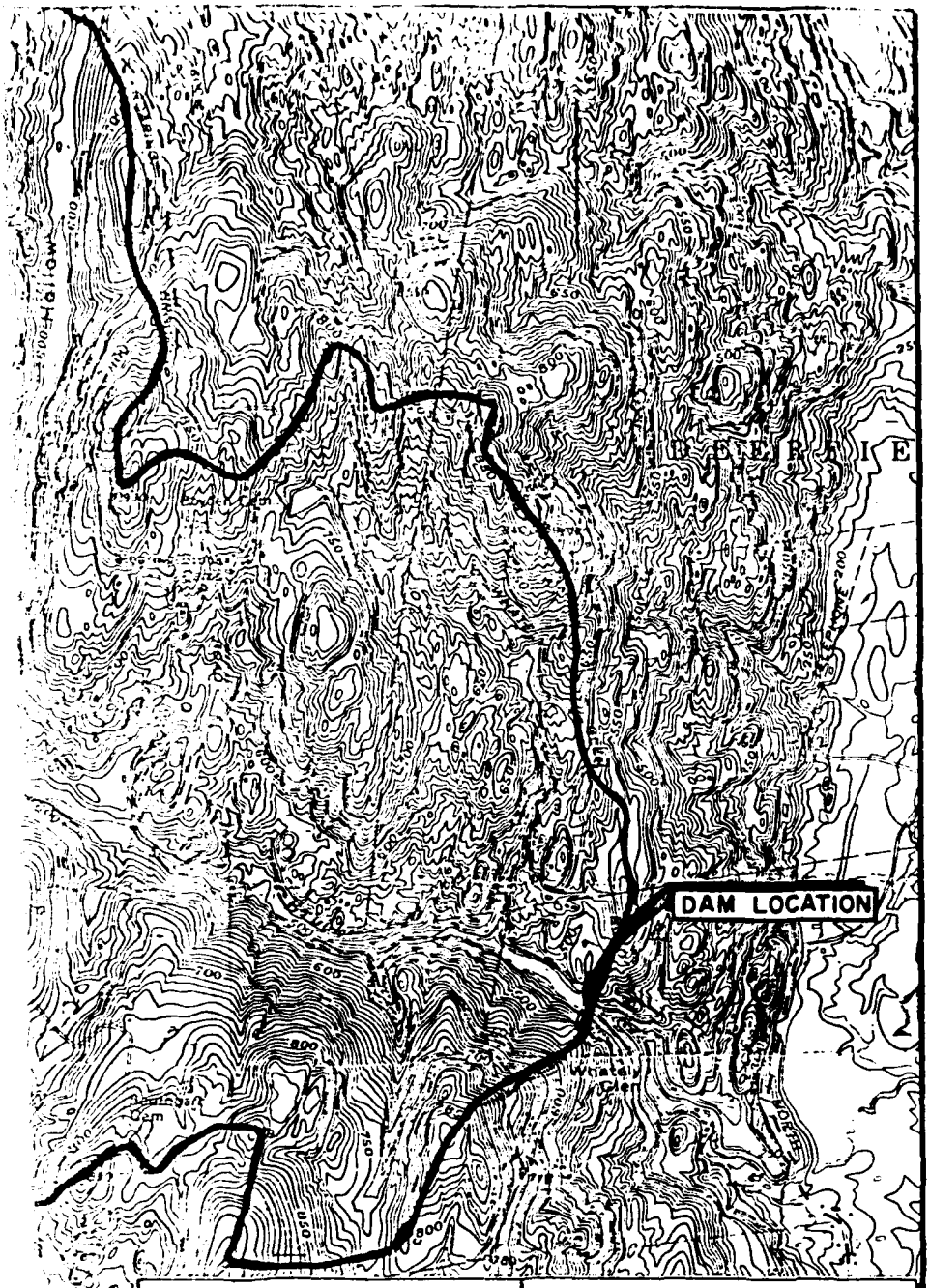
NATIONAL PROGRAM OF INSPECTION OF NON-FED

SOUTH DEERFIELD WATER SUPPL

WHATELY MASSACHU

SCALE 1" = 2000'

DATE MAY, 1979



HAYDEN, HARDING & BUCHANAN, INC. CONSULTING ENGINEERS BOSTON, MASSACHUSETTS	U.S. ARMY ENGINEER DIV. NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASS.

NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS

SOUTH DEERFIELD WATER SUPPLY

WHATELY MASSACHUSETTS

			SCALE: 1" = 2000'
			DATE: MAY, 1978

3 of 3

APPENDIX E

INFORMATION AS CONTAINED IN THE NATIONAL INVENTORY OF DAMS

INVENTORY OF DAMS IN THE UNITED STATES

STATE	IDENTITY NUMBER	DIVISION	STATE	COUNTY	CONGR DIST.	STATE	COUNTY	CONGR DIST.	NAME	LATITUDE (NORTH)	LONGITUDE (WEST)	REPORT DATE DAY | MO | YR
MA	522	NED	MA	011	01				SOUTH DEERFIELD WATER SUPPLY	4228.0	7239.2	25MAY79

POPULAR NAME	NAME OF IMPOUNDMENT
	ROARING BROOK

REGION	BASIN	RIVER OR STREAM	NEAREST DOWNSTREAM CITY–TOWN–VILLAGE	DIST FROM DAM (MI.)	POPULATION
01	6A	ROARING BROOK	AMHERST	0	1145

TYPE OF DAM	YEAR COMPLETED	PURPOSES	STRUCTURAL HEIGHT (FT.)	HYDRAULIC HEIGHT (FT.)	IMPOUNDING CAPACITIES MAXIMUM (ACRE–FT.)	IMPOUNDING CAPACITIES NORMAL (ACRE–FT.)	DIST	OWN	FED R	PRV/FED	SCS A	VER/DATE
MACI	1905	S	32	28	32	23	NED	N	N	N	N	25MAY79

REMARKS
21 CONCRETE 22 APPROXI IN 1953 DAM REDESIGNED & ENLARGED

D/S HAS	SPILLWAY CREST LENGTH	SPILLWAY TYPE	SPILLWAY WIDTH (FT.)	MAXIMUM DISCHARGE (FT.)	VOLUME OF DAM (CY)	POWER CAPACITY INSTALLED (MW)	POWER CAPACITY PROPOSED (MW)	NAVIGATION LOCKS NO.	LENGTH (FT.)	WIDTH (FT.)	LENGTH (FT.)	WIDTH (FT.)	LENGTH (FT.)	WIDTH (FT.)	LENGTH (FT.)	WIDTH (FT.)
S	120	C	40	1150												

OWNER	ENGINEERING BY	CONSTRUCTION BY
SO DEERFIELD WATER SUP	W C KENTWORTH	

REGULATORY AGENCY			
DESIGN	CONSTRUCTION	OPERATION	MAINTENANCE
NONE	NONE	NONE	NONE

INSPECTION BY	INSPECTION DATE DAY | MO | YR	AUTHORITY FOR INSPECTION
HAYDEN HARDING & BUCHANAN INC	12APR79	PL 92-367

REMARKS:
31-PROVISIONS FOR FLASHBOARDS 46-DISTRICT 47-1953 REDESIGN

END

FILMED

7-85

DTIC